The Mining Journal

London, March 10, 1961

In this issue . . .

Vol. 256 **No. 6551**

Established 1835

Editor
U. Baliol Scott
Deputy Editor
A. Graham Thomson
Assistant Editor
R. Bowran

Display Advertisement Manager
E. S. Hooper
Circulation
Robert Budd

Published each Friday by
THE MINING JOURNAL LTD.
Directors
E. Baliol Scott (*Chairman*) — U. Baliol Scott (*Managing*)
G. A. Baliol Scott — R. A. Ellefsen

15 WILSON STREET, LONDON, E.C.2

Telegraphic Tutwork London
Telephone MONarch 2567 (3 lines)

Annual Subscription £3 15s. Single copy ninepence

A Higher Price for Silver?

IN recent years the growing demand for silver for industrial uses, the arts, and to a lesser extent coinage has resulted in world consumption greatly exceeding production. The average world production of the white metal during 1955-59 was about 225,000,000 oz. annually including a Russian output of about 25,000,000 oz. of which none has been exported. Consumption of silver by industries and the arts alone has been rather more than the global yearly output. Moreover, demand for coinage has revived, reaching 85,000,000 oz. in 1959, and the trend is still upwards. For instance, in the last year or so France has been buying silver for her new coinage programme that is likely to continue for some time. The introduction of decimalized coinage in South Africa created a small fresh demand for the metal. Austria, Italy, Portugal and Greece have also been minting on a small scale and it seems unlikely that there will be any reverse of this trend elsewhere.

Thus in 1960 the deficit of world silver production was about 120,000,000 oz. while reductions in the output of lead and zinc by the world's major producers will result in less silver being produced in 1961, since, with the notable exception of Mexican mines, silver is a by-product metal.

The deficiency in silver has consequently been met from the U.S. stockpile, from scrap and to some extent by secondary metal. One large source of supply exclusively for American domestic use has been the U.S. Treasury-free reserves of silver, that is silver not used for coinage nor as backing for the currency. This source, however, is drying up. From the high level of 202,000,000 oz. in 1958 it is now down to 123,000,000 oz. which is sufficient for not much more than two years based on the current annual deficit of some 50,000,000 oz.

It is quite clear that unless a new and realistic price is established for silver, one that will stimulate the search for and production of the metal, then the world will soon face a severe and chronic shortage. Moreover, because the United States consumes about half the world output of silver, her price policy is the key to the world situation.

Since 1946 it has been mandatory for the U.S. Treasury to buy and sell silver at fixed prices. It must make silver available to domestic consumers from its free stocks at $0.91 per f.oz. delivery at the San Francisco Mint. In the same year the buying price was laid down at $0.905 per f.oz., and in the past few years the average price of silver in the principal open markets of the world has remained relatively stable, fluctuating in a narrow range near the U.S. fixed prices. Another factor governing silver prices has been the buying and selling policy of the Bank of Mexico, representing the leading silver producing country of the world.

For some years the U.S. Treasury was able to absorb domestic output at premium prices but now that its current price is below the market price not only has its purchases virtually come to an

end but it had to supply American industry with 21,500,000 oz. last year. Clearly the authorities cannot face a continuing drain from thin reserves of this order. There are two main alternatives. They can tap the silver that is held as backing for American $5 and $10 silver certificates, 1,711,500,000 oz. at the end of 1960, which could be replaced by gold-backed Federal Reserve notes. Such a step, however, would require a drastic revision of Administration policy. Another method would be to cease selling silver from the free stocks or to fix a price well above the market level in order to conserve them. The U.S. Government is under continual pressure to take one or other of these steps and in the event of a decision to ban sales or to raise the price, the effect on the world market would be swift and powerful. Taking into account the statistical position of silver, hopes of a substantial price rise stem largely from an appreciation that the Kennedy Administration is most likely to resolve its dilemma the latter way rather than to attempt a repeal of the Monetary Act of 1934 which among other things directed that monetary reserves should be raised to one-quarter of the total.

In spite of the recession in the U.S. last year when the number of unemployed rose to 5,000,000, the output of the steel industry fell to less than half its rated capacity, and the number of motor cars in dealers' hands rose to 1,000,000, the production of copper, lead and zinc outstripped consumption. In this period, industrial users of silver nevertheless absorbed approximately 100,000,000 oz a decline of only three per cent from the previous year. Imports of silver into the U.S. decreased for the third successive year, falling by 13 per cent to 55,700,000 oz., exclusive of silver returned against lend-lease obligations amounting to 4,600,000 oz., leaving a balance of 30,500,000 oz. still to be repaid.

In these circumstances the price of silver was established at a peak of 91⅜ c. per oz. in the U.S. and remained at this level throughout the whole of 1960. In London the spot price of silver was quoted at the high of 80¼d. per oz. at the beginning of the year falling to a low of 79d. on March 18, but recovering to close at the end of the year at 79⅞d. On January 24 last the price rose another ¼d. to 79⅞d.

Partly because of the imminent coinage programmes already mentioned but more probably in anticipation of a rise in silver prices, hedging in silver was increasing throughout the second half of 1960. By December forward silver was quoted ⅛d. premium over spot while the price already this year has risen from 79¼d. on January 3 to 80⅝d. on February 10, remaining at that level until the end of the month with the exception of February 21 when 80¼d. was quoted.

Since the trend towards demonetization of national currencies, so necessary a few years ago to enable lease-lend obligations to be met, has now given way to a rising demand for silver to mint, the only possibility of an unpredictable supply is from China, which not only has enormous stocks, including 30,000,000 Chinese dollars minted by the U.S. in 1949 but could become a heavy seller of silver, in particular for the foreign exchange to make good the reported failure of crops last year. Already considerable quantities of silver are reported to have been purchased from China by the London market in February. Beyond the Chinese source there is, of course, the supply of secondary silver which as far as the U.S. is concerned yielded approximately 30,000,000 oz. annually during the period 1953-58, a total which might well rise in the face of an increased silver price.

Although the outlook for increased silver supplies in the current year is on the whole a bleak one, this is certainly not true of the prospective demand for the metal, for which industry has yet to find a satisfactory substitute. Industrial demand for silver is not only expanding for its principal use in the manufacture of photographic materials, in silver solders and brazing alloys which, with varying proportions of base metals are widely used in the electric appliance, air conditioning and automotive fields, but also for its use in new directions, for instance, for high temperature applications in jet aircraft and space vehicles.

KOLAR GOLD RUMOURS DENIED

Rumours that the future of the gold fields at the Kolar Gold Mining Undertakings was being "threatened" and unless new reefs of gold were discovered soon, the gold fields would have to be closed, were baseless, said Mr. T. Subrahmanya, Mysore's Law and Labour Minister recently. (See *The Mining Journal*, February 24, p. 221.)

He was presiding over the mines' day celebrations of the Kolar Gold Mines Undertaking. He said that as a matter of fact, the mines had generally done well and the working results so far had shown a gradual upward trend after the difficult problems of transition in the post-nationalization period were brought under control. During 1959-60, after paying a royalty of Rs. 3,669,000 and a depreciation amount of Rs. 1,576,000 from out of the gross profits, there had been a surplus of Rs. 1,826,000.

The Minister said that the Nundydroog mine had recently beaten all records of the past 80 years by milling 24,759 tons in August, 1960. Similarly the Champion Reef mines had established an all-time record of 19,350 tons in September, 1960. The ore realized from the mines during the year 1959-60 was nearly 12,000 tons more than the previous year's production and the gold yield also increased by nearly 2,000 oz. The workers of the mines were to get bonuses of two months wages calculated at the rate of 26 days per month. This would benefit about 20,000 employees and the total quantum of the bonuses was about Rs. 2,050,000.

Regarding the proposal of the Government of India to take over the mines, the question is under discussion between Mysore State and the Government of India. There were only two courses open in this connection, said Mr. B. D. Jatti, Chief Minister of Mysore: either the setting up of a corporation for the management of the three mines, or handing over the management of the mines to the Government of India.

OCEAN BED DRILLING AT 12,000 FT.

All is now ready for the first attempt at drilling in deep water. Cuss I, an American research ship, is now standing loaded with a mass of complex equipment and miles of drill rods and casing, and will soon be departing for a site near Guadelupe Island off the Mexican Pacific Coast. Here it is intended to start a series of cored drill holes reaching down to the Mohorovic Discontinuity. This is the comparatively unknown boundary between the earth's crust and the inner part of our planet.

What is of particular significance to mining men is the difficulties facing the drilling crews. The holes are to be put down under some 12,000 ft. of water—far above the usual 200 or 300 ft. evidenced in current off shore oil-well operations and mineral prospecting. The vessel will not be anchored but held in position over the borehole by four auxiliary diesel engines mounted outboard. Positioning will be maintained by utilizing pulses from marker buoys anchored on the ocean floor which will enable the pilot

instantly to correct for any movement of the ship. When one considers the difficulty of maintaining normal borehole alignment even when the drilling machine is absolutely stable on land, some idea is given of the complexity of the problem facing those responsible for the Moho drillings.

The site of the drillings—to be started in March—has been carefully chosen as it is believed that it is in this area that the surface crust is thinnest. Observations so far suggest that the diamond drills will hit the hard rocks after some 500 ft. of sediments. Although core samples will be taken throughout the length of the hole and will prove of inestimable value to geologists and biologists, probably the *raison d'être* for this operation is to develop techniques for deep water drillings.

ONTARIO'S EXPANDING MINERAL INDUSTRY

Ontario's mineral industry has so expanded in the space of little more than a half-century that its annual production now totals just about $1,000,000,000. In general the mining picture throughout the province is bright. So writes T. A. Gilmour, Public Relations Office, Ontario Department of Mines, in an article contributed to the *Western Miner and Oil Review*.

Perhaps the brightest outlook is enjoyed by interests concerned with the development of Ontario's great resources of iron ore, of which there are perhaps as many as a hundred known occurrences. One of the largest, and the most highly advanced in preliminary development work, is that of Anaconda Iron Ore (Ontario) Ltd. north of Nakina, where very extensive reserves have been outlined along a 20-mile strike and a pilot plant has been constructed.

In the Kirkland Lake area, an additional diamond-drilling programme is being conducted on the iron property of Jones and Laughlin Steel Corporation, and in the Kowkash area of north-western Ontario Can-Fer Mines is carrying out pelletizing tests. An intensive exploration and diamond-drilling programme carried out by Rio Tinto on the iron property of North American Rare Metals in Scholes township in the Temagami area has indicated a very extensive deposit of iron ore. A shaft is being sunk and concentration tests are under way.

Altogether last year, Ontario's production of iron ore totalled nearly 6,000,000 tons valued at $48,500,000. The operations of Steep Rock Iron Mines are constantly being expanded and the company is conducting an extensive exploratory programme on its magnetite property at Lake St. Joseph. The great Caland enterprise, when in full stride, is expected to double the output from the Steep Rock range. It was anticipated that 1960 shipments would total 900,000 tons and annual production is expected to reach 3,000,000 tons within a few years.

Algoma Ore Properties is producing steadily from the underground Helen mine and from the Sir James open pit, and in south-eastern Ontario the Marmoraton mine is now in its sixth year of production. At Moose Mountain, near Capreol, Lowphos, a subsidiary of M.A. Hanna started production in April, 1959. The high-grade ore milled by International Nickel in the Sudbury district also represents a substantal addition to Ontario's production.

Although two gold mines ceased milling operations last year due to depletion of ore reserves, there are more prospective gold producers carrying out preliminary exploration or development work than for several years.

The higher price of silver has stimulated exploration and development at Cobalt, though the situation regarding cobalt metal itself is less encouraging. Operations in the Sudbury area are proceeding at an accelerated pace at all producing mines. Both Falconbridge and International Nickel had a highly successful year in 1960. West of Timmins the Kam-Kotia copper property is being readied for the start of operations early this year.

ISRAEL'S MINERALS

Most of Israel's mineral resources are situated in the Negev according to a mineral exploration survey summarized in a recent Israeli Government publication on "Facts About Israel". This conclusion is the result of extensive geological surveys undertaken since Israel gained her independence in 1948. Previously, only the Dead Sea potash was partially exploited on a fairly large scale.

Israel's minerals include the potash, bromine, magnesium and common salt of the Dead Sea, and in addition phosphates, bitumen-bearing rock, granite, gypsum, oil and natural gas. Iron ore, too, has been discovered at Mount Ramin where reserves have been estimated at 40,000,000 tonnes.

The Ministry of Development is responsible for the exploration and development of mineral and power resources, and up to March, 1960, about I.£500,000,000 had been invested in development undertakings, including I.£280,000,000 in electricity projects. The government encourages foreign and local investment in this field.

Surveying, research and exploitation in connection with mineral resources are carried out by development corporations in which the majority shareholding is government owned. These corporations include the Dead Sea Works Ltd., Sodom, the Dead Sea Bromine Co. Ltd., Sodom, Negev Phosphates Co. Ltd., Oron, Israel Mining Industries Ltd. (The Timma Copper Works), and Negev Ceramic Materials Ltd. Also in this category is the Haifa company Fertilizers and Chemicals Ltd. However, recent reports about this enterprise suggest that the government has decided to transfer the majority of the shares to an American group called the Israel Investors Corporation which would leave approximately one-quarter of the voting shares retained by the government and the co-operative agricultural sector.

Fertilizers and Chemicals Ltd. are operating a number of chemical plants in Haifa, and one of them uses phosphate rock from the Negev for the production of superphosphate fertilizers. Others produce ammonia, sulphuric and hydrochloric acids, di-calcium phosphate and potassium sulphate.

Prospecting rights in the Negev have been granted by the Israeli Government to the Alumina Corporation of U.S. which has formed a subsidiary company, Israel-American Phosphates Co., for this purpose. This subsidiary is to invest about £90,000 sterling over the next two years in prospecting for phosphate over 120 sq. km. in the central Negev. Under the agreement with the government, if economic deposits are discovered, it will build a plant for the enrichment and defluorization of at least 500,000 tons of ore annually; but no compensation is to be claimed if economic deposits are not found.

Royalty on the mining rights would not exceed that paid by the Israel Phosphate Co. (at present 2 per cent), and in no case be above 7.5 per cent. In the event of successful prospecting the Israeli Government has agreed to construct the necessary approach roads, and if the company can guarantee an annual output of at least 600,000 tons of phosphates, the railway will be brought to the plant.

Egypt's Mining and Mineral Resources — I

Metal Mining in Egypt

Known mineral deposits in Egypt, which are not large, are mostly being exploited near the Red Sea and the Gulf of Suez and in the Nile Valley but a thorough examination of the country's mining potential has yet to be made. Bearing in mind that about 97 per cent of Egyptian territory is desert and only important for its mineral resources, there is every inducement for an expansion of exploration and mining. Though restricted by a shortage of geologists and mining engineers, the industry is nevertheless currently in a vigorous phase of development. The following article, the first of two instalments, describes the metal mining operations at present being conducted in the country

By

G. A. Schnellmann

PR.D. (Lond), A.R.S.M., M.I.M.M.

IT is common knowledge that the cultivated parts of Egypt are virtually restricted to the Nile valley and delta, which account for barely 3 per cent of the country's total area. The remaining 97 per cent comprising the Western and Eastern deserts and the Sinai peninsula, is almost totally devoid of water and vegetation, and is only economically important for its mineral resources. Such deposits as are at present known and worked are in the category of small to medium size and are few in number in relation to the size of the area, but well-known though the country is, and ancient though its civilization, it cannot be said to have been thoroughly examined from the point of view of a mining industry.

Geological maps of the country have been published to 1 : 2,000,000, 1 : 1,000,000 and 1 : 250,000 but they are not generally available and very few areas have been studied in the detail required for mineral exploration. The deposits being exploited are for the most part adjacent to the Red Sea and the Gulf of Suez or are in the Nile Valley, that is to say conveniently situated with regard to the transport routes.

Exploitation of known deposits remote from such lines of communication has in the past been retarded by the lack of suitable methods of transport, the problem being a dual one, namely, not only that of taking the mineral out, but also that of taking supplies, and especially water, in. The greater robustness of motor vehicles and their increased reliability in cross-country conditions, particularly in the post-war years, has done much to solve this problem, and there is at present considerable activity in prospecting and in the assessment of deposits both by private enterprise and by government-sponsored organizations.

The fundamental geological mapping of the country continues to be the responsibility of the Geological Survey but there are two official bodies who are more directly concerned with the exploration and exploitation of mineral deposits other than oil. These are The Economic Development Organization, usually known as TEDO or EDO, and The General Organization for Executing the Five Year Industrial Plan, usually known, as the Plan Organization. Although their respective functions do not appear to be entirely mutually exclusive, it is broadly true to say that the Plan's duties are of a research and exploratory character while TEDO's are executive. The Plan, for example, has teams prospecting for non-metallics, and has had foreign experts investigating base metal deposits with the object of assessing reserves, methods of working, mineral dressing, and so on.

TEDO was established early in 1957 for the express purposes of engaging as the government's agent in commercial, industrial, agricultural and financial activities, and of laying down the investment policy for the funds placed at its disposal. Among the 57 companies in which it participates are five mining enterprises, of which three are in production and the other two in a stage of advanced development. In connection with government facilities for the mining industry, mention must also be made of the National Research Centre in Cairo, which has a well-equipped section for dealing with mineral dressing problems up to pilot scale tests.

Egypt is experiencing an acute shortage of experienced economic geologists, mining engineers, and mineral dress-

ing engineers, and in an effort to make good this deficiency the aid of foreign technologists has been sought. So far this has been obtained from countries of continental Europe on both sides of the Iron Curtain, but there are signs of an increasing desire for British technological advice.

Manganese

Manganese or more correctly manganiferous iron ores were discovered by the Geological Survey at Om Bogma in the Sinai peninsula in 1898. They were first acquired by German interests in 1908 and have been continuously mined since that date, although their ownership has had a checkered history. As a result of the First World War they were sequestered by the British Custodian of Enemy Property, from whom they were acquired by British interests. Following the hostilities in 1956 they were again sequestered, this time by the Egyptian Government and the company, now known as the Sinai Manganese Co., is now wholly owned by TEDO, i.e. the Egyptian Government.

The orebodies have been described as beds, and this is perhaps a useful description for general purposes although it is not geologically correct, and has in the past led to excessive estimates of reserves. They are in fact a series of discontinuous flat lenses which occur at the base of the carboniferous limestone and are related to the numerous faults in the area. The mines are situated in a highly dissected and rugged terrain some 15 miles east of the port of Abu Zenima, on the Gulf of Suez, which was constructed for their exploitation and to which the ore is transported by a ropeway 6½ miles long followed by a narrow gauge railway 10 miles long. A relatively small proportion of the output is hand-sorted and sold as manganese dioxide, but by far the greater part is shipped as run-of-mine ore. After a severe setback due in part to the occupation of the mines by the Israelis in 1956 and in part to the subsequent economic recession in the U.S. steel industry, which had been the main customer prior to the 1956 war, the run-of-mine ore is again finding markets. Current production is once more approaching the rate of 200,000 tons a year of material averaging 21-22 per cent manganese, 37 per cent iron.

A project is under consideration for the construction of a ferro-manganese plant, and the general outlook for the industry is good.

Iron Ore and Beach Sands

Iron ore is being mined at Aswan as part of the integrated operations of The Egyptian Iron & Steel Co. (founded in 1954), the blast furnaces of which are located at Helwan, near Cairo. The rate of production at the mines is therefore adjusted to the furnace requirements, and no ore is exported.

The ore is a sedimentary deposit and consists of oolitic hematite. It occurs at three horizons in the Nubian sandstone. The area is topographically a dissected plateau, and the stage of erosion is such that much of the ore is surficial. Reserves have been estimated at some hundreds of millions of tons varying between 40 per cent and 70 per cent iron. Obviously, the proportion of this tonnage which can be regarded as ore in the exact sense must be determined by the cut-off grade, which is in turn decided by economics of the steel production plant.

The black sands on the beaches of the Nile Delta are being exploited by The Egyptian Black Sands Co. (founded in 1957), which is producing monazite for internal use by the Egyptian Atomic Energy Commission, and ilmenite, magnetite, zircon and rutile for export. In addition to this the Société Générale d'Ilmenite (founded in 1957) is developing a hard rock mine at Abu Ghalaga, in the Eastern Desert. Production from this mine is imminent, and the ore will be shipped through the port of Abu Ghusun, on the Red Sea about 230 kms. south of Kosseir. At a later date a domestic titanium industry is planned. Reserves are said to be 4,000,000 tons proved and 4,000,000 tons probable, averaging 40 per cent titanium dioxide and 42 per cent iron oxide. The initial rate of production proposed is 100,000 tons a year.

Gold

Gold was probably being mined in Egypt six thousand years ago, but the record is not continuous and there appears to have been a period of several centuries during the early part of the Christian era when the existence of the mines was completely forgotten. The modern phase dates back to the early part of the 19th century when expeditions were sent to explore the old workings in Upper Egypt. At the turn of the 19th century there was a speculative boom which ended with the First World War. Then interest was revived in the 1930's as a result of the abandonment of the gold standard by many countries and the consequent rise in the price of gold.

All the known occurrences are auriferous quartz veins in the basement complex of Upper Egypt. An authoritative estimate in 1945 gave the reserves as a 1,000,000 tons of ore running between 4 and 10 dwts., and added that there are areas which have been proved to run well above 10 dwts. The industry is a small one and production, as already implied above, has been erratic. The maximum production was 7,000 ozs. in 1940, for example, which fell to zero in 1942, but had risen again to nearly 1,000 ozs. in 1943. It has been estimated that any material containing 4 dwts. per ton would be classifiable as ore once transport and water difficulties had been overcome.

Lead, Zinc and Copper

The Associated Mines Co. was established in June 1956 for the exploration and exploitation of ores of lead, zinc, and copper. The principal areas examined to date are the lead-zinc deposit at Um Ghaig, and the lead-zinc-copper deposit at Um Samiuky, both near the Red Sea coast of the Eastern Desert. These are still in development stage.

Rum Jungle's New Lease of Life

Rum Jungle uranium mine, in Australia's N. Territory, which was worked by opencut using modern earth-moving equipment with the mined ore stockpiled, has exhausted the known orebodies, but has kept the treatment plant running on the stockpile, of which a substantial tonnage still remains for treatment. Yet the mine may have a considerable extension of life. As previously reported, a new orebody has been discovered on the leases, and reserves of ore have been established by diamond drilling which are stated to be comparable with the total orebodies already mined. The ore is reported to be high grade, from which it can be assumed that its value approximates ore now being treated. The discovery is the result of a drilling campaign extending over 18 months.

It is proposed to follow the previous policy of opencut mining by contract, but the final decision depends upon the price for the work, for which tenders have been called.

Research on Pulmonary Diseases

THE cases of diffuse pulmonary fibrosis frequently observed in association with a pneumoconiosis of occupational origin present a variety of problems which are in need of definitive and continued study. Certainly, not all dusts discovered in the lung at first glance are unequivocally responsible for the pulmonary disease which may be present.

In general, states the paper by Dr. Arthur J. Vorwald, the pneumoconioses are usually recognized as belonging to either the biologically inert and benign or the biologically active and injurious categories. The inert type concern those dusts which do not provoke a significant inflammatory reaction either in the lung or in the draining tracheobronchial lymph nodes, a classic example of these being iron oxide, which does not provoke a significant inflammatory reaction, even after 365 days. The injurious type provoke a specific inflammatory reaction of two main types:—nodular and/or seminodular lesions uniformly scattered throughout the entire lung and non-nodular, diffuse and widespread pneumonitis.

Dr. Vorwald went on to describe both types of pneumoconiosis. The nodular form, he said, was classically produced by prolonged exposure to high atmospheric concentrations of extremely small particles of free crystalline silica, usually quartz dust, and a case history of this type of disease was cited. Two case histories of patients who had suffered from diffuse fibrogenic pneumoconiosis were also cited as well as experiments undertaken on rabbits. The first case history supported the view that inhaled pure graphite dust was biologically inert, whereas natural graphite dust was biologically active in proportion to its free crystalline silica content, though the studies in respect of graphite were admittedly incomplete. In the second case, it would appear that the diffuse pulmonary fibrosis resulted from inhaled biotite mica, though there was some uncertainty about this and other inhaled agents may have been primarily, if not solely, responsible, since experiments had shown mica to be an inert substance.

Cause of Silicotic Lesions

Dr. Schepers discussed the "Theories of the Causes of Silicosis", reviewing 50 of the main theories of the causation of silicotic lesions. These theories were broadly classified as exploratory, chemical, physiological and biological and all had contributed to the understanding of the problem, he stated, but since there was still some apparent ignorance about the causation of silicosis, collation and critical analyses of recorded data might serve a useful purpose. Though most of the manifestations of silicosis could be accounted for it remained difficult to formulate an all-embracing theory, since there were over 500 varieties of siliceous compounds, over 3,000 minerals with which siliceous minerals may be associated and over 7,000 published contributions on dust diseases.

The chemical theories are based on the fact that siliceous dusts are all chemical compounds and the body tissues also are composed of organic chemicals. Various theories based on this relationship were discussed by Dr. Schepers. Outstanding among these was the polymeric silica concept by Holt (1957) which dealt with the capacity of dissolved silica to lead to the formation of polysilicic chains of undelimited complexity, but this was not yet considered

Two further papers, one by Arthur J. Vorwald, Ph.D., M.D., F.C.C.P., Professor and Chairman, Department of Industrial Medicine and Hygiene, Wayne State University, Detroit, Michigan, U.S.A., on "Diffuse Fibrogenic Pneumoconiosis" and the other by G. W. H. Schepers, M.D., Dr.Sc., Haskell Laboratory for Toxicology and Industrial Medicine, E.I. du Pont de Nemours and Co., Wilmington, Del., U.S.A., on "Theories of the Causes of Silicosis", complete the set of papers presented at the McIntyre Research Foundation's Conference on Silicosis and Other Pulmonary Diseases, held in Toronto during January 25-27, 1960

adequate as an explanation for silicosis. A final notion on this chemical aspect suggested that if actual combination of SiO_2 or of Si (OH_4) with tissue was the essential feature in silicosis, it was necessary to consider all the substances in the lung with which silica could combine, the lung being the repository of a large number of mineral elements of both extrinsic and intrinsic origin.

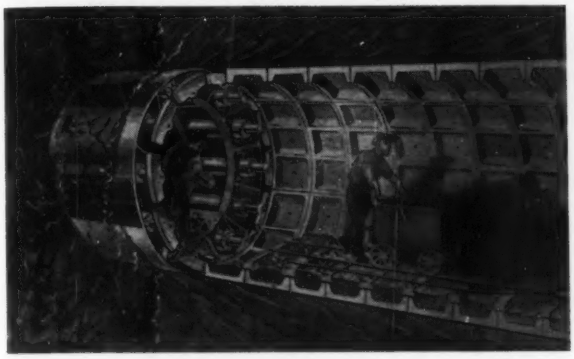
The Physical Theories

The physical theories dealt with covered a range from the fallacious angularity theory of Zenker (1866) to present day surface area and adsorption theories. Since surface was probably, in part, the key to the problem, other forces at the surface had also been measured and compared with pathogenicity. Two of these had offered some hope. The electrophoretic mobility correlated more distinctly with pathogenicity, said Dr. Schepers, than did the heat of wetting, and the molecular density of silica also was relevant, particularly since it was a function of solubility. When the pathogenicity of varieties of silica was plotted against their molecular densities, however, the linear correlation with respect to solubility broke down. Instead, it was evident that the main group of pathogenic silicas had a specific gravity between 2.1 and 2.8.

Latterly, it had been increasingly recognized that the pathogenesis of silicosis reflected a synthesis of physicochemical and biological forces and, since the silicotic nodule was something fabricated entirely by the living animal tissue, while the silica particle underwent minimal change, silicosis represented a biological process rather than a chemical or physical phenomenon. Dr. Schepers then cited a number of theories put forward on this basis showing in what setting the primary process, which occurs at the particle-protoplasm interface, has its being. Such interaction may be one of protein denaturation, or anzyme destruction, but this had not been fully worked out.

Though most of the foregoing facts directly explained the development of silicotic lesions several phases were unaccounted for, and the initial response to retained SiO_2 was quite dissimilar to the end result. At first, microvascular reactions, cellular invasions and cell destruction predominated; later vascular response decreased, cell types changed and granulomata formed. Degeneration then set in, followed finally and belatedly by fibrogenesis. Since the lesion remained evanescent or reversible until necrobiosis had commenced, this suggested that a fibrogenic factor may be released from desintegrating koniophores, or that the death of the histiocyte terminated the production of a homeostatic agent which normally kept procollagen in solution.

Hydraulic Power for Tunnelling



Principle of tunnelling by hydraulically powered shield

Shield cutting 7 ft. 8 in. dia. in the downstream tunnel

THE system of excavating tunnels with the aid of a shield is not new, but is certainly in greater use now than ever before. A recent article in *One and All*, Vol. 7-1, No. 25, a publication by Tangyes Ltd., has described the system which, although in this particular application related to the Clyde tunnel, obviously is of marked interest in the mining industry.

The Clyde tunnel is being lined with cast-iron segments forming a circular bore of 29 ft. 6 in. dia. Work is proceeding under compressed air conditions, with the aid of two Greathead shields which are 14 ft. 4 in. in length and 32 ft. 4 in. dia. Each weighs approximately 350 tons. The hydraulic rams or thrust jacks, 40 on each shield, are capable of developing a thrust on the shield of 5,000 tons at a working pressure of 5,000 lbs. per sq. in.

The cast iron segments have a total weight of 17,500 tons and are bolted together by some 250,000 steel nuts and bolts. Each ring of segments placed behind the shield after each advance are lifted and positioned, a segment at a time, by a revolving erector assembly and pick-up arm. This arm, consisting of a capstan and boom, traverses slightly more than the complete 360 deg. of a circle.

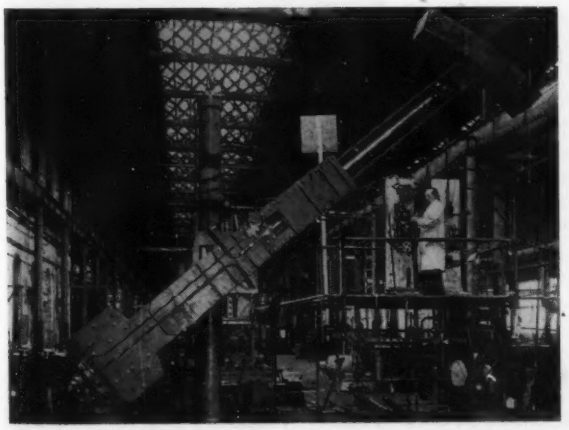
One end is mounted with a balancing weight and the other carries a securing device to which a segment can be attached. The latter is virtually a ram-head and the ram moves out under hydraulic pressure, in a radial direction, to position the segment where required. The circumferential movement is also operated by hydraulic power through a large rack and spur gear, each end of the rack being tied to a ram and the spur gear attached to the boom. The complete unit is attached to the trailing side of the shield.

In addition to the 40 thrust jacks built into the shield, and the capstan and boom on the trailing side, there are 56 face and platform jacks and 12 muck door jacks also accommodated. Control valves are placed together within the shield with an operator's platform as indicated by the temporary structure erected in the works for testing purposes. There are four control valves controlling the thrust jacks, capstan, boom, and muck door jacks, and stop valves to each thrust jack enable individual isolation of any jack when required. There are stop valves and relief valves to each face and platform jack.

Also included in the structure are two 6 in. stroke and two 4 in. stroke vertical pressure pumps, two hydropneumatic accumulators working in conjunction with the 4 in. stroke pumps; one three-plunger horizontal pressure pump.

This hydraulic equipment was designed and manufactured by Tangyes Ltd. for Joseph Westwood and Co. Ltd., the shield constructors. The main contractors are Charles Brand and Son Ltd., and the consulting engineers are Sir William Halcrow and Partners.

Large rotating arm with tunnel segment attached



Further view of boom showing its telescopic construction

THRUST!

Hand over that 'muscle' job to an AEI electro-hydraulic thrustor.

These simple units eliminate the tiring, manual work involved in operating valves, dampers, doors, clutches, small presses; repetitive jobs which cause manual fatigue, reduce efficiency, and slow down production! Easily maintained and cheap to operate. No valves, packing glands or external piping. Ideal for smooth brake operation on cranes and conveyors.

Switch on — and the thrustor does the work!

A fractional h.p. motor operates a centrifugal oil pump, the output of which operates the thrustor piston. Ratings: From 40-lb thrust, 2-in stroke to 800-lb thrust, 12-in stroke.

Full details may be obtained from your local AEI district office, or write to:

AEI

Associated Electrical Industries Ltd

MOTOR AND CONTROL GEAR DIVISION, RUGBY, ENGLAND

A 5600

Visit Stand No. K14 at the A.S.E.E. Exhibition, Earls Court, March 21-25

Prospecting the Underwater World-IV

By D. Taylor Smith

Lecturer in Mining Geophysics, Royal School of Mines, and Consulting Geologist to the Channel Tunnel Study Group

THE disadvantages of the Decca Navigator system can be overcome to a certain extent by the use of "sonobuoys". A sonobuoy is a flag-buoy which consists essentially of two parts: one part is a sensitive hydrophone which will pick up the sound of an explosion, or similar noise, made in the water near a boat; and the other part, a radio pulse transmitter which will be triggered by the arrival of the sound in the hydrophone. Several of these are used in a marine survey. The usual procedure is to place two of these in a line parallel to the shore, about 5 miles apart and, say, about 9 miles from the shore, and to fix them in position by visual methods from the shore. A boat's position can now be fixed by means of some form of explosive sound (the spark, say, in a Sparker survey) exciting the sonobuoy, with the transmitted pulse recorded in the boat. Since the time of the initial explosion is accurately recorded in the boat, and since the travel-time of the radio pulse is almost instantaneous, the time difference between the two will be due to the travel of the initial sound through the water to the sonobuoy. Consequently, the distance can be calculated, and with two buoys an intersection can be obtained fixing the position. So that the survey can be extended outwards, and accuracy of positioning maintained, additional sonobuoys are dropped at strategic positions, and their positions fixed relative to the two original buoys. The procedure for fixing the further buoys is straightforward: the boat travels from the known to the unknown buoys, sending out signals at definite intervals, and since the boat's position can be fixed relative to the known buoys, the reverse procedure can be used to calculate the position of the unknown buoys. This method is probably the most accurate system of surveying an area remote from land.

The methods of prospecting and position-fixing indicated above are those in current use today. These methods will probably suffice for the immediate needs of any off-shore mineral exploration, but as these techniques become discarded, as of no value in certain areas, others will have to take their place.

Additional Methods of Prospecting

Two possibilities come to mind at the moment: heat-flow measurements and gravity observations.

An old mining tale in Canada is that the snow always melts first on the ground above the lode. On this basis attempts have been made to measure heat-flow as a method of mineral exploration. However, measurements of heat-flow on land is inhibited by surface temperature fluctuations. As a result, temperatures have to be measured in deep wells below this fluctuation, and below the effect of circulating waters. On the other hand on the sea-floor, particularly in the deeper waters, the temperature is constant so that no trouble arises from such causes. Thus, determination of the rate of heat-flow may prove to be a new method of off-shore mineral prospecting.

Gravity observations in water-covered areas, in the search for large oil structures, have been carried out for many years. The work is slow and laborious involving either the placing of large tripods on the water-bottom in shallow (3 fathoms) areas, or in the deeper regions the use of some form of waterproof gravity meter, resting on the bottom, and read remotely. Generally speaking, in fair weather it is possible to read about 30 stations in a normal working day; such a small output is only justifiable in the search for large structures where the stations are some distance apart. The technique in the shallower depths may be improved in the future by the use of aqualung-divers; certainly some sort of technique as this would be necessary for gravity work over small-scale mining structures. Again, it may be possible to use a ship-borne gravity meter at some time in the not-too-distant future. A gravity meter has been developed which can be used from a surface vessel, but with the present equipment the accuracy of measurement is about 1 milligal which is increased to 2 milligals when ship navigational errors are considered. This is too high a figure for normal exploration where an anomaly of 0.1 milligal can often be provided by a sizeable body of economic value. But with further research it may be possible to reduce this figure and produce an instrument that will play a large part in prospecting over water.

Creating New Areas of Exploration

The methods outlined above, of course, can be used to solve any geological problem off-shore. But one of the most important economic applications is that of locating underwater zones of mineralization, including the delineation of structures suitable for oil accumulation, so that the natural resources of the lands adjacent to them may be increased. The future prospects are immense. As Garnett points out, in Cornwall alone the use of aqualung-fitted geologists would increase the prospecting area by 55 per cent—and this only two miles from the shore! This is something to think about.

REFERENCES

Garnett, R. H. T. 1960. "Off-shore Mineral Exploration". Proc. of the Royal Institution of Chartered Surveyors.

Garnett, R. H. T. 1960. "Underwater Geological Exploration". Royal School of Mines Journal.

Graindor, M. J. 1959. "Une methode de geologie sous-marine". Rev. de Geographie, Physique, et de Geologie Dynamique.

Hosking, K. F. G. 1959. "The mineral potential of Cornwall—a summary". I. M. M. Symposium (1958).

Mason, R. G. 1958. "A magnetic survey off the west coast of the United States". Geophysical Journal.

Mason, R. G. 1960. "Geophysical investigations of the sea floor". Liverpool and Manchester Geological Journal.

Shepard, F. P. 1959. "The earth beneath the sea". Oxford University Press.

Taylor Smith, D. 1955. "Geophysical Methods of Oil Prospecting". Petroleum.

Taylor Smith, D. 1959. "Shallow seismic prospecting", I. M. M. Symposium (1958).

Machinery and Equipment

Mining Role for Thermoplastic Piping

The gold mining and uranium industries in South Africa appear to be providing a convincing case for thermoplastic piping where normal steel pipe is subject to unusual wear or corrosion.

One supplier in the field is the British-based Durapipe & Fittings Ltd. a member of the Incledon & Lamberts Group. In the Union, distribution is handled by another member of the Group, H. Incledon & Co. (S. Africa) Ltd., which has a number of branches serving the mining areas, and will have sole agency for the territory.

Information recently received reveals that arrangements have been completed for production in the Union. The piping will be manufactured by Pretoria Industrial Plastics Ltd., a subsidiary of the Anglo-Transvaal group. Under the arrangement, the piping will be fully up to the standard of the U.K. product. All fittings will continue to be supplied from Britain.

Durapipe & Fittings Ltd. manufactures three types of plastic piping, each of a different chemical composition and application. Durapipe Z is a Ziegler polyethylene, more rigid than conventional polythene and is stronger with better performance at high temperatures. Particularly suitable for handling concentrated mineral acids and other corrosive materials it is also stated to be excellent for water. Temperature range is from −22 deg. F. to 120 deg. F. It takes higher temperatures (without pressure) for short periods.

Durapipe K is a copolymer of acrylonitrile butadiene stryrene. An excellent water pipe, stronger than the Z, it stands higher temperatures. Its range is 38 deg. F. to 170 deg. F. (resistance to frost is not so good as with the Z) and shows excellent qualities in a wide field of uses. Large quantities are reported to be used in oil fields, refineries and gold mines.

Durapipe V is a rubber-modified high-impact PVC, with even greater mechanical strength than K, although it cannot work under such high temperatures. Its limit is 120 deg. but its chemical resistance is similar to K (in some cases, i.e. inorganic acids, it is even better). The V type does not support combustion, and this resistance makes it very suitable where fire hazards are a factor, as in the mining industry. All three types are made in normal and heavy gauge for each size (¼ in. to 6 in. N.B.) K and V also made in light gauge for lower-pressure work (drainage, etc.).

The fittings (450 in all) are made with British or American standard pipe threads moulded in manufacture. The K and V plain fittings have no thread and are used with a solvent cement which is simply brushed on and produces a homogeneous weld. The Z plain fittings up to 2 in. are heat-welded with a special tool. All types of Durapipe can be hot-bent by normal methods. In general, the limit of radius is less than 5 dia.

The advantages of Durapipe are claimed to include the elimination of electrolysis and most corrosion problems, easy installation, requiring less time and equipment due to simplicity of jointing, low internal friction and higher flow rates due to smoothness of bore, reduced installation costs compared with steel, high heat and burst resistance compared with ordinary polythene pipe, no internal build-up of hard deposits, and good machining properties. The equipment is made to close tolerance (plus or minus three thou.) and it needs no exterior maintenance.

BRITISH MANUFACTURERS AT MOSCOW

The impending British Trade Fair, to be held in Moscow during May 19 to June 4, 1961, is attracting the attention of U.K. manufacturers of mining machinery. The exhibition is sponsored by the British and Industrial Trade Fairs Ltd., in conjunction with the Association of British Chambers of Commerce, and is designed to provide a shopwindow for the sale of British goods in Russia.

Three major products manufactured by Dowty Mining will be on exhibition at the stand of their agents—Joberg Ltd. These products are the Dowty Roofmaster, the Dowty Duke hydraulic pit prop and the Dowty 50-ton hydraulic chock.

BTR Industries Ltd. will exhibit a wide selection of conveyor belting for underground and surface application, including NYPAC, the most recent addition to its range, which has safe working stresses ranging from 40 lb. p.i. per ply up to 200 lb. per inch per ply. This NYPAC range of belts, particularly suitable where acid or chemical contamination is likely, are nylon wefted and combined with either cotton, rayon or 'Terylene' according to the tensile strength required.

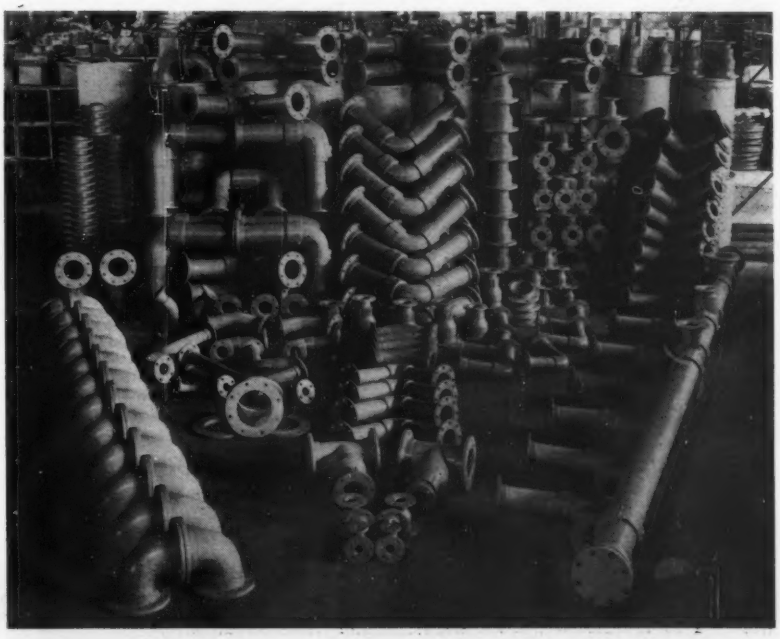
Two Hawker Siddeley Industries companies—Fuller Electric and Brush Electrical Engineering—will figure prominently on the group's stand, with exhibits which will include a model of one of the supergrid transformers now in service in the United Kingdom, a ring main unit, and a range of specialized flameproof equipment for use in coal mines and in the oil and chemical industries, where explosive or inflammable materials are present.

HIGH EFFICIENCY MAGNETIC VIBRATORS

Magco Ltd., have long felt that a reversal of the static to fixed weight ratio of electro magnetic vibrators could result in a considerable increase in efficiency and at the same time enable a reduction in production costs. The company has carried out a number of experiments on these lines and with its new design therefore, the bottom unit, which carries the armature, is comparatively light whilst the upper, moving unit, consists of a casting on which is carried the laminations and coil.

These MAGCO electro magnetic vibrators have many uses and applica-

Selection of moulded plastic fittings by Durapipe and Fittings Ltd.



tions the most common of which is where a difficult or damp material will not flow freely forward out of a hopper. Manual hammering will assist but will not give a reasonable and continuous flow and in any case is damaging to the hopper. A complete range of sizes is available suitable for the smallest pharmaceutical packaging machines to bunkers holding hundreds of tons of run-of-mine ore or coal.

In the case of the smaller vibrator units they operate twice per cycle thus giving 6,000 vibrations per minute on a 50 cycle supply or 7,200 per minute on a 60 cycle supply. In the case of the larger models they operate on a half wave system, giving 3,000 vibrations per minute on a 50 cycle supply and 3,600 on a 60 cycle supply.

FLASH MELTING NON-FERROUS METALS

The North Eastern Gas Board began work early last year on the development and design of a furnace for the rapid melting of non-ferrous metals. A series of development projects were carried out resulting in the design of a unit with a melting capacity of approximately 100 lbs. per charge incorporating load recuperation in addition to combustion air pre-heating. The general sequence of operation is to place in the load recuperation section the entire 100 lbs. charge. Normally, the charge would remain in this section for a period of 8 to 10 minutes, while the previous 100 lbs. charge was being melted in the melting section.

On production trials, the unit proved to be very successful in operation from at least three aspects: A very much improved quality of metal cast as compared with crucible furnace techniques; a marked reduction in metal loss during the process; the fuel consumption per lb. of metal is very much reduced as compared with present day methods. There is a continual discharge of molten metal into a holding section or pot which is maintained with a small auxiliary burner at a temperature suitable for casting. This technique reduces metal losses. Under normal conditions the combustion air is pre-heated to something in excess of 300 deg. C.

STOPPING CONVEYORS

An emergency stop device for conveyors that is immediately effective whenever the operator's hand is passed over the conveyor at any point between its ends, is now being manufactured and marketed by Hird-Brown Ltd.

The device, operated by a beam of light and a photo-electric cell, cuts to an absolute minimum the time between an emergency being detected by the operator and stoppage of the conveyor. The unit has also been arranged to fail safe so that component failure will stop the conveyor.

The device is simple to install and in single units can be used with ray lengths of up to 75 ft. although longer lengths can be accommodated by overlapping units.

*

General Electric's Locomotive and Car Equipment Dept., of America, has recently demonstrated remote radio control of a 25 ton industrial diesel-electric locomotive including starting, stopping, standing, reversing. Wireless communication is maintained between a portable transmitter, weighing less than 15 lb., and a receiver mounted on the locomotive. Powered by self-contained rechargeable batteries providing 8 hr. continuous operation, the transmitter operates within a radius of ¼ mile emitting a continuous carrier. This maintains the "fail-safe" pilot relay in the receiver in the closed position thus forestalling emergency power and brake conditions on the locomotive. A "deadman" switch removes the carrier in case of operator failure.

Equipment Digest

Atlas Copco have produced a new range of tractor-mounted air compressors. Designated by the type nos. 80IT, 100IT and 125NT, the new machines have been specifically designed to be carried and powered by the most popular makes of tractor. They are of the two stage, single acting, piston type with intercooler, and are simple to operate. One does not have to be a skilled mechanic to maintain them. These compressors are intended for mounting on the tractor's three point hydraulic linkage, the connecting points to the tractor draw-bars being adjustable. Mounting or dismounting can be carried out in a few minutes. A splined propeller shaft for connection to the tractor's power take-off is provided.

*

The raising of heavy loads by a crowbar usually calls for two operators. The first raises the load, and has to exert effort to keep the load raised, whilst the second operator inserts a wedge or second crowbar.

A new device to facilitate single handed operation with reduced effort consists of a crowbar from which a high tensile steel bar may be projected beneath the end of the blade at the end of the lifting stroke. This bar gives positive support to the load, so that the operator is relieved of effort as soon as he has completed the lift. The device is manufactured by H.C. Slingsby Ltd.

*

The type 1208 variphase strobe unit has been specifically designed by Dawe Instruments Ltd. to enable components or equipment undergoing vibration test to be viewed stroboscopically in slow motion, irrespective of the drive frequency, with the range 5 c/s to 5 kc/s. The equipment can also be used to facilitate the optical calibration of vibration pick-ups or to provide a calibrated, continuously variable phase sine wave from a single phase input.

Used with the Dawe type 444 automatic L. F. sweep oscillator, suitable power amplifier, vibration generator and Dawe stroboscope, it provides the basic equipment needed for vibration resonance search and endurance tests called for in British Standards BS2011 and G100, Inter-Service Specifications RCS11. DEF-5011 and K114 and the International I.E.C. Publication No. 68.

*

A leaflet just published by Midlands Silicones Ltd. lists the properties and applications of MS 4 silicone compound, a highly versatile substance. MS 4, which is non-melting and retains a grease-like consistency from −50 deg. C. to 200 deg. C., has excellent dielectric characteristics, is highly water-repellent and resists oxidation.

Its principal uses are as a dielectric potting material for transistors and other electronic equipment, as a lubricant on electrical contacts, meter bearings and other mechanisms; to seal electric heating elements, aerial connectors, plugs and sockets against the ingress of moisture, to prevent corrosion on battery terminals, leads, spark plugs and almost any equipment liable to rust or corrode, and to prevent the sticking of lamp caps, screw connections and of switches which may be prone to icing up. Copies of the new publication, C6, are available upon request from Midland Silicones.

*

A 95 ton payload truck, the 95-EDT—a tractor-trailer combination described as the largest production truck in the world—has been presented to the mining industry by the KW-Dart Truck Co., United States. Until recently the limiting factors in increasing the vehicle tonnage have been the horsepower requirements and tyre capacities. The diesel engine is a 4-cycle V-12 rated at 700 h.p. and weights 5,700 lb., giving a horsepower to weight ratio of 8.1 lb. per h.p. The vehicle tractor-trailer and body has a combined unladen weight of 120,000 lb., thus permitting a payload of 190,000 lb. Said to be unique in mining service, the frame is made up of four heat-treated, pressed steel channels bolted together back to back, in pairs, forming I-beams. Steel used has elastic limit of 110,000 lb. p.s.i.

*

The English Electric multi-motor control centre has been designed to enable a series of motors of different horse powers ranging from fractional to 400 h.p., to be started from some convenient central point by means of centralized contactors, control wiring and interlocking devices. In a typical control centre the smaller horse power starters (up to 25 h.p.) are mounted in banks on compartment doors to form separate "swing out" units, while the medium horse power starters (up to 100 h.p.) are mounted in "draw out" chassis compartments.

*

In an article entitled "Cadmium Sulphide Crystals for Gamma-Ray Detection" by Dr. J. Franks, of the AEI Research Laboratory, published in *AEI Engineering Vol. 1 No. 2.* factors affecting the sensitivity and response of cadmium sulphide crystals to radiation, by virtue of their photoconductivity are discussed.

Cadmium sulphide gamma-ray cells can be used in high density fluxes which would cause a Geiger counter to saturate. Owing to trapping and recombination effects, the time required to obtain a reading at low radiation levels (near tolerance level) is long, but with improved methods of activation, it already appears possible that cells will be useful in this range.

MINING MISCELLANY

It is reported from Djakarta that gold has been found near Salopa in the Tasikmalaja district of West Java, and that local authorities were making investigations.

★

The Swedish Mining and Metal Processing Co. has sent experts to the Yemen to explore for minerals there under an agreement with the Royal Yemeni Government made in September, 1960. No notable mineral reserves have yet been determined.

★

It is announced from Seoul that the South Korean Government is shortly to send a special government mission to Western Germany to negotiate a $150,000,000 loan for industrial development in the coal mine centre of Yongwol and Samchok, on the east coast of Korea. It is planned to repay the loan from proceeds of selling 10,000,000 tons of anthracite coal to Japan over a period of 10 years. The projected development plan would include a 100,000 kWh. thermal power plant to be built by Siemens of W. Germany, a cement plant and an iron refinery.

★

The British Mining Equipment Export Association has particulars of the specifications for conveying equipment required for the Kolubara opencast lignite mine, for which Feronia of Yugoslavia is requesting tenders.

★

An airborne magnetometer survey, covering 16,000 miles over south-western England has recently been completed by Canadian Aero Service, for the Department of Scientific and Industrial Research, London. The survey extended from an area south of London, almost as far north as Glasgow, over much of the Irish Sea, and west to Athlone in Eire.

★

During 1960, British Guiana produced 704 ozs. of gold compared with 986 ozs. in 1959. Output of gem stones in 1960 was 35,110.23 m.carats, compared with 25,068.15 m.carats in 1959.

★

The Council of the Institution of Mining and Metallurgy state that the term "ore" should only be used to denote a solid naturally-occuring mineral aggregate of economic interest, from which one or more valuable constituents may be recovered by treatment. It should not be used to describe concentrates, e.g. "tin ore" for tin concentrates. The term "ore reserves" should be restricted to ore of which the quantity and grade have been established with reasonable assurance by a responsible professionally qualified person.

★

The rise in the world price of tungsten has resulted in the reopening of small mines in the Tenasserim area of Burma.

★

Diamond deposits, are reported to have been found on the Ghaapse Berg, about 70 miles from Kimberley, South Africa, and options have been taken on a number of farms. The diamonds are said to be in fissures similar to those at Bellsbank, where the average yield is about £40,000 a month.

★

A new company has been formed in Brazil to produce concentrates and agglomerates of itabirite, of which Brazil has almost inexhaustible reserves. Itabirite, with 42 per cent metallic content, is being produced in a pilot plant. It is hoped to export concentrates containing over 60 per cent Fe, with a structure permitting their use in all types of steel furnace.

★

A distillation plant that converts 100 gal. of sea water into 80 gal. of fresh water hourly, is being used to enable a crew of 16 men to live and work aboard a 230 ft. high offshore drilling tower of the National Coal Board, probing the rich coal seams beneath the sea bed off the Durham coast.

★

The Japanese Ministry of Trade has announced that Japan's mining and industrial production is expected to rise 14.7 per cent during the next financial year, compared with an estimated rise of 22.6 per cent for the current financial year, ending April 1 next. During the current period, machinery manufacturing industry production is estimated to have risen 22.9 per cent, and petroleum and coal manufacturing industries 18.3 per cent.

★

Preliminary geologic maps and sections of the Monlevade and Rio Piracicaba quadrangles and the Andrade mine (in the Monlevade quadrangle) State of Minas Gerais, Brazil, are available for public inspection in the libraries of the U.S. Geological Survey, Washington, D.C., and also in the Departmento Nacional da Provincao Mineral, Rio de Janeiro.

★

Noranda Mines is preparing to open a new mine at its property at Kennedy Lake, 100 miles north-west of Victoria, on Vancouver Island, and production is expected to start in early 1962. Noranda has signed a contract to sell 700,000 tons of iron concentrates a year, for seven years, to Japanese steel companies.

★

It is reported from China that exploitation is planned in the near future of minerals discovered by Chinese and Russian expeditions in the Tsaidam Basin of Tibet. The reserves are said to include rich deposits of zinc, lead, copper, gold, iron ore, chrome, and hard coal.

★

The Mexican metallurgical and mining firm of Peñoles is to build a modern zinc refinery in Mexico, and is planning to increase its capital by some 200,000,000 pesos. American Metal Climax Inc., who is the major shareholder at present, has agreed to sell 51 per cent of the Peñoles shares to Mexican interests.

★

The Russian Central Bureau of Statistics has announced that about 107,000,000 tonnes of iron ore were produced in the Soviet Union during 1960,

(continued overleaf)

Ford Motor Co. Ltd. in co-operation with All Wheel Drive Ltd. announce that Goodyear Terratyres will soon be available as a production option on the Thames Trader 4 x 4 range through All Wheel Drive Ltd. A recent test organized by Goodyear and Sir Robert MacAlpine and Sons Ltd. gave an impressive demonstration of the cross-country performance of the Thames Trader 4 x 4 equipped with Goodyear Terratyres. The vehicle used was a 108 in. wheelbase 7 ton Thames Trader fitted with a 5 cu. yd. body. It was converted to four wheel drive by All Wheel Drive Ltd. and was equipped with a David Brown 5-speed gearbox. In place of the conventional tyres were Goodyear Terratyres 46 x 18 x 20 (front) and 46 x 24 x 20 (rear)

which was 13 per cent more than the 1959 total of 94,400,000 tonnes. Hard coal output rose by only 1 per cent during 1960, from 506,500,000 tonnes in 1959, to 513,000,000 tonnes, of which coking coal accounted for 110,000,000 tonnes, an increase of 9 per cent.

★

Exploitation is planned by LKAB of four iron ore fields in the Svappavaara district of Lapland in 1965. Initial exploitation of 500,000 tonnes annually, is to be brought up to 3,000,000 tonnes annually by 1967/8. Combined ore reserves of the first two fields to be worked, Leveaniemi and Gruvberget, are estimated at 300,000,000 tonnes. Total investment for the first five years is estimated at over 100,000,000 Kr., and the Swedish State Railways is to spend a further 40,000,000 Kr. in rail installations. The Svappavaara project will be Sweden's third biggest iron ore mine, after Kiruna and Malmberget. LKAB's capacity is estimated at 24,000,000 tonnes annually after 1965, compared with 15,700,000 tonnes in 1960.

★

A U.S. trade mission has arrived in Jamaica to discuss trade and investment proposals with the government, and representatives of the bauxite industry.

★

Iron ore from West Australian deposits at Mt. Goldsworthy and Tallering Peak are expected to be shipped to Japan within the next two years. The Japanese steel mills are prepared to buy 1,000,000 tons of iron ore annually, for 15 years, from these deposits.

★

The Ontario provincial government is to make the uranium mining community of Elliot Lake interest free loans totalling $4,372,000 over a period of four years, to assist operations. The loans are to be repaid progressively between 1965 and 1976.

★

Quebec Cartier Mining Co. is building one of the world's largest beneficiating plants at its Lac Jeannine iron ore property, in Quebec-Labrador. The plant will handle about 20,000,000 tons of open pit ore annually, and produce 8,000,000 tons of concentrates.

★

A pier to handle 35,000 ton and 45,000 ton colliers is planned at Lamberts Point, Norfolk, Va., U.S., at a cost of $19,000,000. The pier, which should be completed in two years, will allow dumping capacity to some 1,800 cars a day in peak periods, and should avoid dumping delays.

★

American Metal Climax Foundation has established graduate fellowships in non-ferrous extractive metallurgy, valued at about $4,000 each a year, at Columbia University, Purdue University and the University of Missouri School of Mines and Metallurgy, to contribute to the advancement of education in metallurgy.

★

Yugoslavia plans by 1965 to have brought silver production up to an annual figure of 10,500 kgs., and refined lead up to 6,100 tonnes.

Brno International Trade Fair, 1961

This year Czechoslovakia will hold the International Trade Fair from September 10-24, at Brno, in the exhibition grounds where three Czech engineering exhibitions and the two Brno fairs took place in 1959 and 1960.

Czechoslovakia now holds second place in world production, per head, of machine tools and metal processing machines, and manufactures about 350 different categories of machine tools. Further industrial development during the next Five-Year plan, 1961-1965, will increase the importance in the country's economy of the machine tool industry, which is expected to rise to 69 per cent of total economic production. The engineering industry is also planning increased development.

The basic feature of the Trade Fair is its engineering specialization, with particular regard to the metallurgical industry, as well as to raw materials and allied semi-fabricated products. Exhibitors from 28 European and overseas countries participated in the Brno International Trade Fair of 1960; this included 70 exhibitors from Great Britain.

The Trade Fair in 1961 is being organized on different lines from the previous exhibitions. The idea of collected expositions from individual states has been discarded, and the countries participating in this year's Fair will only be represented as complete national entities in the Pavilion of Nations, held in Pavilion A. In the other 12 pavilions, the products are being shown according to species, all exhibits of the same kind being grouped together, so that visitors may be able to appraise and compare the individual products with similar ones from other parts of the world. The branches of the industry to be shown thus will include machine tools, metal forming machines, equipment for industrial automation and regulation, conveying equipment, etc.

The large number of British manufacturers participating in this exhibition shows that British business interests realize the importance of the Brno Trade Fair and of the opportunity it offers for maintaining and broadening the existing mutual business relations between the two countries.

Personal

We regret to announce the death of Mr. Justus Sjögren, chairman of Sandvik Swedish Steels Ltd., and Sandvik Steel Band Conveyors, of Birmingham, at the age of 82. Mr. Sjögren, among his many activities had been Consul for Sweden in Birmingham for 28 years.

★

Mr. G. A. H. Jones and Mr. S. J. L. Hill have been appointed directors of Powell Duffryn Ltd. Mr. Jones is managing director of Stephenson Clarke, and Mr. Hill is managing director of Cory Brothers and Co., two subsidiaries of Powell Duffryn.

★

Mr. E. S. Everitt has been elected director of Ruston and Hornsby (Australia) Pty. Mr. Everitt is managing director of Ruston-Bucyrus and a director of Bucyrus-Erie Co. of South Milwaukee, U.S.A.

★

The National Coal Board announce that Mr. D. M. Clement has been appointed director-general of finance. He succeeds Mr. A. W. John, who has become finance member of the National Coal Board.

★

Ferodo Ltd., announce the appointment of Mr. B. G. Hill as export sales manager.

★

Mr. Alexander Gakner, has resigned from the Federal Bureau of Mines, to become assistant vice-president, international division, of Royer and Roger, Inc. Mr. Gakner plans to continue research activities on the mineral economics of the Soviet *bloc*, within the framework of Royer and Roger's activities.

★

Mr. J. K. Brooke and Mr. R. M. Dreyer announce the formation of a consulting practice in mining engineering, geology and geophysics in San Francisco.

AEI announce the following appointments: Mr. E. T. Muston is appointed general superintendent, Rugby Works; Mr E. Edmundson, is appointed manufacturing manager, AEI Electronic Apparatus Division, and Mr. G. P. Thompson, becomes manager, Rugby Works.

★

Johnson and Phillips Ltd. announce that Mr. L. J. Brown and Mr. H. D. Walker have joined the board of directors.

★

Robert Hudson Ltd. announce the appointment of Mr. Eric Wood as home sales manager.

★

BTR Industries Ltd. announces the following appointments to the boards of a number of its subsidiary companies: Dr. W. D. Scott as chairman, Mr. C. G. Erlam as managing director and Mr. J. J. Molins as assistant managing director of Microcell Ltd.; Dr. Scott as chairman and Dr. G. Ader as managing director of Artrite Resins, Ltd.; Mr. Erlam as chairman, Mr. P. L. Watson and Mr. J. A. Hemingway as directors of Palmer Aero Products; and Dr. Scott as chairman and Mr. D. J. Hodgson as managing director of Glass Yarns and Deeside Fabrics Ltd.

★

Mr. James Oldroyd has been appointed general manager of the Lead Development Association. He has resigned from his present position of secretary of the British Electrical and Allied Manufacturers Association, and will take up his new work in April.

★

Mr. J. A. Croft, at present deputy chairman and managing director of Crofts Engineers (Holdings) Ltd., has now been appointed chairman of that company and its principal operating subsidiary companies, including Crofts (Engineers) Ltd., and Carter Gears Ltd.

Technical Briefs

Apparent Resistivity of a Single Uniform Overburden

An analysis of the two-boundary resistivity problem, with tables for numerical applications, has been published by the U.S. Department of the Interior as Geological Survey Professional Paper 365. The author of this report which is entitled *Apparent Resistivity of a Single Uniform Overburden*, is Irwin Roman, whose purpose is to facilitate the interpretation of resistivity observations by the development of theoretical formulæ and corresponding curves.

In 1931, Roman published a mathematical analysis and a set of tables for use in the interpretation of resistivity measurements made at the surface of the earth, which was assumed to consist of a uniform overburden of constant thickness overlying a uniform bed of infinite thickness. This paper is the result of a study intended to improve the analysis and tables of the earlier paper. Terminology has been clarified by a systematic description or definition of terms used. The upper limit of the argument in the tables has been increased in extent from 5 to 30, corresponding to lateral separations of current poles from potential electrodes of 10 and 60 times, respectively, the thickness of the overburden. Local expansions for small arguments have been augmented by asymptotic expansions for large arguments.

The increase in the range of the argument was the result of inadequacy of the earlier tables in investigating new methods of exploration. Over the years problems arose in which greater ranges were needed. Among these were the single-probed method and multiple layering. In the former, the potential-reference electrode or that electrode and one current stake, are remotely located. Although the contributions of these points to the measured potential differences are small, and sensibly constant over the area of survey, to regard them as negligible is not justified for all purposes, especially if the measured potential difference is small. In the latter, a distance that is a few times the depth of the lowest contact can be many times the thickness of the top layer.

The need for more significant figures also arose in the investigation of new methods of exploration, especially when the potential differences are much smaller than the separate potentials involved. This condition arises when the potential difference is measured between two points that are closely spaced with respect to their distances from the current poles, as can happen in the single-probe method or the potential-graduate method.

In the present report a development for a single overburden of uniform thickness has been made and formulæ derived that involve infinite series. The series has been evaluated for the geophysical case in which the measuring configuration is located on the surface of the earth. A set of curves that can be superimposed on the field observations has been prepared to permit direct determination of the resistivity and thickness of the overburden, and the resistivity of the underlying medium.

D.S.I.R. MINERAL PROCESSING INFORMATION

In setting up the Warren Spring Laboratory, it was decided that one of its functions would be to act as a centre for information as well as research in mineral processing.

To this end two information notes have been issued as the first of a series. The first deals with *Super Critical Grinding* and includes a brief survey of the literature and an account of research which is being undertaken in various countries. A glance at the list of laboratories now engaged in work on this subject and the embarking on a research programme indicates the very considerable interest which is being shown, and further notes indicating progress will be most welcome.

The second publication deals with *Cyclones in Mineral Processing* and is a useful review of currrent information although unfortunately, it does not contain any reference to the paper presented at the recent international Mineral Processing Congress by Bradley dealing with the design and performances of cyclone thickness.

Not only is the present state of knowledge concerning the theory and design of cyclones, both as classifiers and concentrators discussed, but some attention is also given to their construction, various unconventional designs and to liquid and gas separations in cyclones.

RECOVERY OF CASSITERITE AT SUNGEI BESI

In a paper presented to the I.M.M., pilot plant work leading to the design of a new concentrating plant at Sungei Besi, Selangor, Malaya is described, in which special attention has been given to desliming and to ensuring efficient recovery of fine cassiterite. Owing to reduction in mining costs due to post-war advances in earth moving equipment, it is now possible to treat much lower grade (down from 3.3 lb. per cu. yd. to 0.85 lb. per cu. yd.) ground at a profit but it has become a necessity to handle the increased throughput due to mechanization and to make more provision for the recovery of fine cassiterite.

The pilot plant operations involved desliming tests with rake classifiers and cyclones, experiments with feed preparation by means of screening and the recovery of fine cassiterite on Humphrey's spirals.

The flowsheet used in the new plant indicates the modern trend in tin dressing in Malaya involving a number of modifications and considerable advance on the former treatment which consisted simply of puddlers to disintegrate the clay, followed by concentration in four compartment jigs, from which a concentrate was withdrawn for cleaning in further jigs being finally dressed to marketable grade.

In the new flowsheet the discharge from puddlers is deslimed in 24 in. primary cyclones to remove most of the clay and fine material, the cyclone underflow being concentrated in jigs with only two compartments. The tailing from these jigs passes over DSM screens making a split at about 16 mesh, the undersize being treated in further cyclones and scavenged in a further battery of 2 compartment jigs.

The overflow from the primary cyclones passes to 14 in. secondary units, the underflow from which was intended for treatment on spirals as a result of the pilot plant work. Since the complete plant has been put into operation, however, it has been proved uneconomic to treat this material. The concentrate from the primary jigs is cleaned in a secondary jig and the tailing screened to remove any fine cassiterite before being discarded so that this can be recovered in spirals. It is necessary to employ further spiral sand tables for cleaning.

The treatment of alluvial tin as well as the problem of evaluating alluvial ground in the field is also discussed in a paper presented to the I.M.M. at the same meeting by F. A. Williams. It is certain that a great deal of the fine cassiterite has escaped during panning in the field and in consequence many valuations are likely to be less than that which can be recovered by improved methods of concentration.

The method described ensures that all slime removed before panning a sample is treated in a portable cyclone and the fine sand sent to a central laboratory where it is treated on a superpanner. In the same way, the tailing from panning is screened and the fine sand sent to the laboratory where any further values are recovered by a small scale table. The resulting concentrate is then subjected to various procedures including magnetic separation, acid leaching, etc., to remove impurities and a final valuation made by grain counting screen-sized fractions under the microscope.

An examination of these suggestions reveals that in general they are being either incorporated or are being tested in existing plants but they are worthy of careful consideration. Cyclones are, of course, suggested for desliming as well as two stage operation such as is being used at Sungei Besi whilst the practice of screening the tailing from the jigs and retreatment of undersize is mentioned.

The use of a groove and a splitter to remove some of the heavier material concentrated in the bottom of the tailing palongs was also mentioned by a speaker as a means of scavenging the jig tailing. Such an enriched product, representing only a fraction of the total throughout, will sometimes justify suitable screening and further concentration of the undersize. The use of closed circuits in the secondary or tertiary jigs is also recommended by Williams together with the use of shaking tables in such circuits to remove fine cassiterite as well as other high specific gravity minerals which might otherwise build-up in a closed circuit, and it would appear that in certain circumstances, such a circuit might be advantageous.

Metals and Minerals

Europe Uses as Much Nickel as the U.S.

Increased consumption of nickel last year, which reached a new peak of about 257,500 s.tons, occurred largely in the Western European market where industries used about 117,500 s.tons against 85,000 s.tons. This growth in European consumption reflects not only the rapidly expanding European economy but also the greater use of nickel in a wide variety of applications. It has, says Mr. Henry S. Wingate, chairman of INCO, in his annual statement to shareholders, made the European market, including the United Kingdom, equal in size to the United States. Whereas consumption in Europe rose approximately 40 per cent, that in the U.S., so long the world's largest market, declined slightly, mainly because of the reduced operations in the steel industry in the second half of 1960. Nickel consumption in Canada increased to an estimated 6,500 s.tons.

INCO's deliveries of nickel last year amounted to 175,940 s.tons against 158,520 s.tons and compared with 102,900 s.tons in 1958, the lowest level for ten years. Copper deliveries were 146,270 s.tons against 126,225 s.tons. Deliveries of platinum, palladium, rhodium, ruthenium and iridium fell to 359,300 oz. from 384,600 oz. the year before. On the other hand deliveries of iron ore rose to 192,000 l.tons from 162,000 l.tons in the previous year.

While the use of nickel in most applications advanced substantially throughout the Free World during the year, the production of stainless steel, particularly in Europe, accounted for the largest gain. The electroplating industry in both the U.S. and Europe took considerably more nickel, mainly as a result of the application of improved techniques requiring more nickel to provide higher quality plating.

By the end of 1960 INCO's new production facilities at Thompson, Manitoba, were nearly ready for operation, and early this year the first electrolytic nickel will be produced there. This is the first fully integrated refined nickel plant and Thompson is the second largest producing centre in the world.

It will add more than 37,500 s.tons of nickel annually to the company's production capacity bringing the total to 192,500 s.tons a year. Operations at Thompson, in the mine, mill, refinery and other plants, are highly automated to effect economical production. The refinery, for instance, employs a direct electrolysis process which was developed by INCO's research scientists and engineers and earlier introduced at the company's refinery at Port Colborne.

Although the Thompson deposits contain nickel sulphide ores, of the same general type as those of the Sudbury district, they contain only small quantities of copper whereas Sudbury ores have a relatively high copper content. Minor quantities of cobalt, platinum, palladium, gold and silver, however, are also present in the Thompson ores.

INCO's proved ore reserves at the end of 1960 stood at 290,273,000 s.tons against 264,864,000 s.tons while nickel-copper content at the end of the year was 8,715,300 s.tons against 7,964,900 s.tons. These reserves figures, for the first time, reflect the inclusion of that portion of the Thompson ores proved to date, that is 25,000,000 s.tons with a nickel-copper content of 742,500 s.tons. It should be remembered, of course, that the company's major effort so far in Manitoba has been on preparing the Thompson mine for immediate production and has not been concentrated on proving up as ore reserves the potential ore in the Thompson mine or eleswhere in the Thompson-Moak Lake area.

In the United Kingdom the productive capacity of the Mond Nickel Refinery at Clydach was increased substantially last year as a result of plant modifications designed to take advantage of improved process techniques. Furthermore, alterations and additions to buildings at the Mond Acton Refinery increased its platinum metals refining capacity.

In Ontario construction continued on the new plant at Copper Cliff for the fluid-bed roasting of nickel sulphide, which is expected to come into operation this year, while a number of plant and process improvements were made to increase efficiency of operations. At the end of 1960 preliminary work was started on a major expansion of the iron ore recovery plant at Copper Cliff which is planned to triple its capacity. In addition, larger quantities of nickeliferous pyrrhotite, which otherwise would have to be handled by the nickel section of the Copper Cliff smelter, will be diverted to the expanded iron ore recovery plant. This change in practice will result in important smelting economies and provide a basis for further major advances in nickel extractive metallurgy. The expanded iron ore recovery plant is planned to be in full operation in 1963 and will cost around $50,000,000.

Looking to the future, Mr. Wingate points to the major increase in total capacity and the establishment of multiple sources of nickel supplies together with a strong stock position as an assurance to the consuming industries of the reliability of supplies.

Orders for the first few months of 1961 have been running at about the same rate as during the second half of 1960, or about 5 to 10 per cent under the annual rate for last year. While demand from Europe continues to be strong the anticipated recovery of U.S. demand has not yet materialized but is expected during the course of this year. Deliveries from INCO's own mines and plants are expected to amount to as much as the total for 1960. Exploration for economic nickel ores this year will again cost over $8,000,000.

"The position of nickel," concludes Mr. Wingate, "in both the established and newer fields of application holds out the prospect that the progress of future nickel consumption may more than keep pace with that of the over-all economy".

GROWING INTEREST IN CAESIUM

Production of caesium and rubidium in the U.S. last year though probably more than in 1959 was less than 100 lb. However, caesium is now produced on a commercial scale by U.S. Industrial Chemicals Co. whose potential capacity at their Cincinnati plant is said to be from 50 to 75 lb. per week.

Mr. F. W. Wessel, commodity specialist of the U.S. Bureau of Mines says in his latest report that the U.S. has been entirely dependent on imports of the ore, pollucite, from Chemalloy Ltd. in Canada. He estimates 1960 output of caesium and rubidium compounds at 5,000 lb.

While minute quantities of caesium have in the past been used in electron and photoelectric cell tubes because the metal ionizes easily it may have growing importance for certain nuclear and space rocket uses. Other applications include its use as a grain refining agent for other metals such as aluminium and as a heat transfer medium in power generators.

WOLFRAM STILL DRIFTING

Wolfram ore shipment prices have drifted further, dealers currently indicating a range of 125s.-130s. per l.ton unit c.i.f. Europe, a fall of 1s. from previous levels. Some business is reported to be passing, but buyers in many instances are inclined to hold back in view of the persistent downward trend.

CADMIUM STOCKS FALL

Stocks of cadmium metal in the U.S. declined 48,000 lb. during the final quarter of last year, according to the U.S. Bureau of Mines. Production of primary and secondary cadmium declined about 4 per cent below that of the third quarter and 16 per cent below that of the second quarter of 1960.

Shipments of cadmium metal by producers, including internal plant consumption, totalled 1,285 s.tons in the second quarter compared with 1,423 s.tons in the third quarter.

MANGANESE ORES STILL SURPLUS

World consumption of manganese ores is relatively good with the exception of the U.S. In Europe and the Far East offtake has been well maintained because of high rates of steel activity. In particular, intake of ore by Japan rose last year, according to trade sources. But there are no indications that manganese ore prices will rise from their current depressed levels. Dealers are not reassured by the undertone of the market: besides plentiful supplies there are willing sellers. While 46-48 per cent material is still mentioned in the range of 66d. to 70d. per l.ton c.i.f. Europe it seems that the bottom, or at any rate the lower end of the range, is a more accurate reflection of the market price.

British imports of manganese ores in 1960 totalled 523,035 tons against 343,203 tons according to the Board of Trade. The principal suppliers were South Africa 141,323 tons (55,217 tons), U.S.S.R. 136,591 tons (104,741 tons) and India 127,947 tons (90,085 tons).

(continued overleaf)

CANADIAN URANIUM EXPORTS DECLINE

During 1960 Canadian exports of uranium ores and concentrates declined 15.4 per cent to $263,541,000 from $311,904,000 the year before. During December last there was a sharp fall in exports of 30 per cent to $18,301,000 from $26,155,000 level reached during the corresponding month of 1959. This, of course, reflects the reconstruction of the industry under the stretch-out arrangements.

ANTIMONY OUTPUT DOWN

Primary and secondary production of antimony fell by almost 9 per cent in the fourth quarter of 1960 compared with output in the third quarter, but over the whole year production rose by about 8 per cent over the 1959 total.

Primary smelters produced 37 per cent more metal and 18 per cent more oxide in 1960 while secondary smelters recovered about 5 per cent more antimony in various alloys. Consumption of primary antimony, which had averaged 3,200 tons a quarter during the first nine months of 1960, dropped 12 per cent to 2,800 tons in the final quarter. Reduced consumption of antimonial lead, most of which is used in batteries, mainly accounted for the decrease.

U.S. URANIUM STUDY GROUP

Last year (December 23, 1960, p. 715), we reported that Canada's six remaining uranium producers had decided to finance a five-year research programme costing $1,250,000 to find and develop uses for uranium in industrial applications and that the Canadian Uranium Research Foundation had been formed to carry out this programme.

Now comes the news that a group of uranium mining and milling firms in the U.S. have organized the Uranium Mining and Milling Committee to promote activities beneficial to the industry. This committee, which according to *American Metal Market* already represents about two-thirds of the uranium mill output in the U.S., is a satellite unit of the Atomic Industrial Forum Inc., the leading trade and scientific association of the atomic industry.

The U.M.M.C. will study the short and long term needs for uranium in the U.S. and abroad, as well as non-nuclear uses for uranium such as in alloys. In addition, it will disseminate information on safety practices and possible hazards in mining and milling and keep a watch on state and federal regulations and legislation which may have some bearing on the uranium market.

Research workers in Canada are intensifying their studies on the development of steel uranium alloys, which offer considerable promise, though obviously this is in the nature of a long-term project so far as the development of a major market is concerned.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Prices are all a little higher than a week ago, but the reasons relating to the various metals are widely different. The revaluation of the German and Dutch currencies had little effect on the markets except to reduce business, whilst traders everywhere were making a thorough re-appraisal of the situation.

COPPER FIRMER

The copper market has been helped somewhat by better demand in the U.S. and by more consumer interest elsewhere. The rather worse situation in the Congo, combined with the news that mediation in the dock strike situation in Chile has failed, also contributed to a firmer undertone. There have been no actual price movements except that the customs smelters were able to reduce their intake price for scrap by ¼ c. per lb. after the large jump last week when the flow of scrap increased considerably, but it is still to be noted that, calculating the normal margin, this still gives a copper price for delivery in three months' time of approximately 29¼ c. per lb. against the December level of 29 c. per lb. Stocks in the U.K. rose a further 315 tons to a total of 15,390 tons, and the possibility of the re-establishment of a backwardation appears to have vanished.

The only other two items of news of interest to the copper market were, first the announcement that negotiations between Russia and Chile had broken down, and that there now appeared to be no chance of a copper order being placed; and second that people were beginning to talk about the Kennecott labour contracts for its western divisions which expire at the end of June. The renewal of these may cause difficulties, as there are two unions involved, each of which may try to outdo the other in obtaining better terms of employment.

TIN POISED FOR SHARP RISE

During the writing of these notes, the International Tin Council is in session, but it is considered that the meeting will be of a routine nature with no startling announcement at the end. Although consumption has been disappointing almost everywhere since last December, no large tonnages of tin have come forward after the removal of the export restrictions last October. In fact, shipments from Malaya have shown a declining tendency amounting to only 5,204 tons in February as compared with 6,295 tons in January and almost 8,000 tons in December.

As always, the future of tin is very much bound up with the American market, but if the usual seasonal increase in buying commences in the near future, the price of tin can go up to the £830 per ton mark. At that level, some metal from the Canadian stockpile may become available, and also the buffer stock manager will be entitled to make sales, should he so wish.

Stocks in London fell 126 tons to 10,019 tons and the contango rate has remained steady. There are reports that there is new labour trouble in Bolivia but, as always, when trying to assess events in that country, it is difficult to know at this stage whether it is likely to prove serious or not as far as the supply of metal to the world market is concerned.

On Thursday the Eastern price was equivalent to £818⅜ per ton c.i.f. Europe.

LITTLE OPTIMISM OVER LEAD-ZINC CONFERENCE

The lead and zinc markets are operating under the shadow of the conference in Mexico City. Although the general feeling is that no action will be taken in respect of zinc and that any agreement on actions to be taken in regard to lead is going to be difficult, prices of both metals have trended upwards.

Stocks of lead in the U.K. fell by 583 tons to a total of 10,447 tons, whilst zinc stocks also fell 228 tons to a total of 3,399 tons. Demand for both metals was a little bit better in the U.S. at prevailing prices. In other parts of the world the continued accumulation of stocks is confined largely to lead. In the U.S., the announced cutbacks in zinc production now amount to between 7,000 and 8,000 s.tons per month, which should go a long way towards helping the situation if the cutbacks prove to be real and not mere mathematical calculations as is sometimes the case on such occasions.

OFFICIAL TURNOVERS

Official turnovers in long tons for the week ending March 4, with the previous week's figures in parentheses, are:—

Copper	16,650	(19,125)
Tin	1,520	(1,345)
Lead	8,650	(9,275)
Zinc	7,675	(10,725)

Closing prices are as follows:

	March 2 *Buyers*	*Sellers*	March 9 *Buyers*	*Sellers*
COPPER				
Cash	£225½	£226	£224½	£225
Three months ..	£226½	£226½	£226½	£226½
Settlement ..	£226		£225	
LEAD				
Current ½ month	£63½	£63¾	£65½	£65¾
Three months ..	£64¼	£64⅜	£66⅛	£66¼
TIN				
Cash	£800	£801	£806½	£807
Three months ..	£803	£803½	809	£809½
Settlement ..	£801		£807	
ZINC				
Current ½ month	£83¾	£83½	£84½	£84¾
Three months ..	£82¼	£82⅜	£83⅛	£83½

LONDON METAL AND ORE PRICES, MARCH 9, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 10d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram.
Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/£28½
Quicksilver, £69 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79½d. f. oz. spot and 80½d. f'd.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	25s. 0d./27s. 6d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	255s./265s. per l. ton unit BeO
Bismuth	65% 8s. 6d. lb. c.i.f. 18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
„ Hard Lumpy 45% .. .. (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
„ Refractory 40%	£11 0s. 0d. per ton c.i.f.
„ Smalls 44% .. .. .. (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% .. .. .. (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) Nb_2O_5 : Ta_2O_5	165s./170s. 0d. per l ton unit c.i f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d. freight	73d./75d. c i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£25 10s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	125s. 0d./130s. 0d. per unit c.i.f
Vanadium—	
Fused oxide 95% V_2O_5	7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2	£16/£16 10s. ton c.i.f

Mining Finance

The Boom in Tin Shares

Far Eastern tin shares have been a sharply rising market since the end of December. This fresh upward movement follows a quite steep advance in the early part of last year, a move which boiled over at the end of June partly as a result of over speculation in Malaya and Singapore. Some impact may also have been made about that time by sales from British Tin Investment's large portfolio of tin shares, which was reduced, it is revealed in the annual report, by 10 per cent to take advantage of the price rises that had taken place by the summer.

Many tin quotations are, however, considerably higher now. Nevertheless despite the cessation of quotas under the International Tin Agreement as from October 1 last, there has been no resultant flood of tin and the London metal price after dipping to around £780 a ton at the turn of the year, compared with a 1960 average of £796, has once more moved up over £800, a highly profitable price for the efficient producers. Statistically the position has now been reached in which an actual shortage of tin could well develop, especially if the American economy should begin to pick up later on this year. This would mean the metal going quickly to £830 a ton, the price level at which the buffer stock manager may sell at his discretion. It has, however, yet to be seen whether he will in fact make any serious attempt to halt a rise in price at this point or whether he will be content to allow the price to go to £880, which is the level at which it is mandatory for him to intervene as a seller.

Two factors in particular seem likely to influence this decision. The first is that under the provisions of the new Tin Agreement, due to come into force on July 1 next, the buffer stock manager, unless in the meantime the Council decides otherwise, is required to be holding 12,500 tons of tin metal which is in itself some 2,000 tons more than he is believed to be holding at present.

The second factor is that with production (other than in the Congo) already fully extended, it is difficult to see where any substantial amount of new metal can come from in response to higher prices, unless it be from U.S. Government stocks. If Washington were to decide to make such a release, it is thought possible that there might be a legislative delay of some months before U.S. stockpile tin could be made available to meet a world shortage. Moreover it seems unlikely that Washington would consider any such action until prices had moved beyond the £880 level and it had become demonstrable beyond dispute that without stockpile aid the situation was in real danger of getting out of hand.

If, in fact, legislative delays seemed likely to inhibit rapid U.S. action, the argument would be all the stronger for allowing the price to go quickly to the £880 level and thereby initiate Washington legislation as soon as possible. The buffer stock manager, who would thus have conserved his metal stocks up to that point, would then probably be able to hold that line (with perhaps support of 3,000 tons of Canadian Government stocks which are also known to be in reserve) until U.S. stockpile tin could be made available.

As there is thus obviously no danger of quotas being re-imposed under present market conditions, the question of whether or not any particular tin company now has the ability to raise its output, after close on six months of dear restrictions, is clearly a matter of prime importance from the view point of the share market.

In the accompanying table we show how tin production by the individual mines has been going in recent times. Not all the companies, however, announce actual production figures. Some still stick to the practice of giving the amount of tin concentrates sold, a practice that grew up when restriction was in force. These sales, as distinct from outputs, are marked in the table with an asterisk. In the cases of Tronoh and Kent the figures are for the calendar years 1959 and 1960, no figures being yet available for the current year.

Tin Company Outputs and Dividends

		Tons of Tin Concentrates produced			Dividends paid	
	Financial year end	This financial year to date	Last financial year to date	Last financial year TOTAL	This financial year to date	Last financial year TOTAL
EASTERN						
Ampat	Dec.	70·2 (1)†	81·2†	879·2†	—	9·6d.*
Anglo-Burma	Sept.	60·0 (3)	55·0	338·0	—	—*
Ayer Hitam	June	1274·8 (6)†	569·0†	1893·7†	7½d.	3/1·5
Berjuntai	April	1983·0 (9)	1434·9	2022·2	—	3/3
Chenderiang	March	184·2 (9)†	100·5†	147·0†	—	6d.
Gopeng Cons.	Sept.	652·0 (3)†	279·5†	1467·2†	9d.	1/10·5*
Hongkong Tin	Sept.	48·2 (3)†	65·2†	304·2†	—	—
Ipoh Tin	March	203·5 (9)†	144·7†	289·0†	—	3/-
Kampong Lanjut	March	1757·2 (10)	705·5	911·0	—	—
Kamunting	March	1340·5 (10)	1054·2	1378·5	7½d.	1/9
Kent (F.M.S.) (a)	Dec.	267·5 (12)†	163·2†	163·2†	—	3d.*
Kepong D.	June	171·2 (6)†	Nil†	Nil†	1/-	3d.
Killinghall	Sept.	112·0 (3)†	80·0†	422·5†	—	—*
Kinta Kellas	March	256·5 (10)	213·7	267·6	6d.	3d.
Kramat Tin	March	529·0 (10)	366·2	508·0	2/6	4/-
Kuala Kampar	March	1255·5 (10)	806·0	944·2	3/6	6/-
Larut Tin	Dec.	38·7 (1)	Nil	119·5	—	—*
Lower Perak	April	920·0 (9)	678·0	1212·5	1/3	2/3
Malayan Tin	June	1586·5 (6)†	1247·5†	3299·2†	9d.	2/6
Malaysiam	March	89·2 (10)†	60·9†	73·1†	—	—
Pahang	July	1061·0 (5)†	735·0†	2252·0†	—	10·8d.
Pengkalen	Sept.	158·0 (3)†	85·0†	391·5†	4½d.	7·5d.*
Petaling	Sept.	416·7 (3)	308·2	1129·7	—	9·8d.
Rahman H	June	162·6 (6)	127·3	231·9	—	—
Rambutan	June	125·8 (6)†	65·0†	129·5†	—	3d.
Rantau	June	441·5 (7)	298·5	537·2	1/4·8 (b)	1/4
Renong	June	344·0 (6)†	407·0†	883·8†	—	9d.
Selayang	Sept.	4·5 (3)	23·0	118·5	—	3d.
Siamese Tin and Subsidiaries	Dec.	237·0 (1)†	134·0†	2681·0†	—	1/6*
S. Kinta	March	3176·0 (10)	2187·2	2686·2	2/1·2	4/-
S. Malayan	June	1961·0 (6)†	1110·0†	2734·8†	1/3	2/5·5
Sungei Besi	March	1450·5 (9)†	552·0†	796·5†	6d.	10·8d.
Sungei Kinta	Dec.	—†	—†	27·5†	—	—
Sungei Way	June	640·0 (6)†	491·5†	1180·5†	—	4·2d.
Tanjong	Dec.	959·8 (12)†	584·5†	584·5†	—	3/7·5*
Tekka	March	(c)	71·0	87·8	—	—*
Tongkah H.	June	1056·0 (7)	243·0	937·0	—	2/-*
Tronoh (a)	Dec.	3302·0 (12)†	2225·0†	2225·0†	—	3/6
NIGERIA						
Amal. Tin	March	3972·0 (10)	2511·0	3101·0	6d.	1/-
Columbite		541·0 (10)	354·0	417·0		
Bisichi	Dec.	62·0 (1)	47·5	625·0	—	—*
Columbite		32·5 (1)	30·0	458·0		
Ex Lands	Dec.	43·0 (1)	50·0	540·0	—	—*
Gold and Base	Dec.	70·0 (1)	70·0	751·0	—	—*
Columbite		5·0 (1)	8·0	79·0		
Jantar	Sept.	89·9 (4)	56·1	119·1	—	6d.
Columbite		119·2 (4)	78·2	238·0		
Jos Tin	July	77·0 (6)	71·0	141·0	—	8·25d.
Kaduna P.	Dec.	5·0 (1)	6·0	77·5	—	3d.*
Kaduna S.	Dec.	21·0 (1)	30·0	266·0	—	3d.*
Naraguta K.	Dec.	8·5 (1)	9·5	117·0	—	—*
U. Tin	March	205·0 (10)	158·5	232·0	—	2.25d.
Columbite		20·0 (10)	24·5	25·5		
MISC.						
Beralt	March	47·0 (10)	231·0	241·0	—	3/-
Wolfram		1720·0 (10)	1534·0	1886·0		
Geevor	March	545·0 (10)	537·0	648·5	6d.	2/6
Rooiberg	June	529·0 (6)	559·0	1103·0	1/6	3/6
S. Crofty	Dec.	82·0 (1)	78·0	856·0	—	—*

(a) Output figures refer to the two immediate past financial years' figures for current year available in April.

(b) On expanded capital. (c) Now under Gopeng.

† Tons exported * Final dividend not yet declared.

WHAT THE MINES RECEIVE

Readers wishing to make a quick approximation of what rising production means in terms of revenue can for practical purposes assume that a Malayan mine receives per ton of concentrate 60 per cent of the Singapore (i.e. Eastern) price of tin metal as quoted in our Metal Exchange column each week, this figure being arrived at after making provision for "Government export duty" and "realization charges". It so happens that in any twelve-month period during the last two years the average monthly Eastern price has been within the range £770 to £775 a ton so that the production figures in the table can be valued at around £465 for the purpose of making a rough estimate of revenue less duty and charges. This would not of course apply to future production, were

the metal price to move sharply away from present levels.

Direct mine costs per ton, as distinct from London expenses and other overheads, do not generally appear to fluctuate sharply with varying production levels but any attempts to arrive at the past year's profits in advance of annual reports are rendered difficult by the impact of restriction quotas which ruled up to the end of September. This is especially so for 1960 when deliveries under the quota system were often running well ahead of actual production during a period when rising quotas were being met partly from accumulated mine-head stocks while steps were being taken to expand production.

SOME MINES WHERE PRODUCTION SHOULD RISE

When it comes to considering which individual mines have a considerable production potential still to be exploited, Sungei Besi looks to be a good example. As the chairman, Mr. G. W. Simms, pointed out in December, although the merger with Hong Fatt took place as long ago as November, 1959, it will take some time before the full benefits can be reaped. Hong Fatt brought in two large opencast mines to the combined properties and there is little doubt that these have greater production potentialities than are at present being exploited. These mines need high-capacity excavating equipment, but the Sungei Besi management has delayed going ahead in this respect while it has been gaining full experience of the big bucket wheel excavator already installed on the Sungei Besi opencast. This has had some teething troubles but is now achieving a gradual improvement in performance and is already working better than the largest of the company's shovel excavators. It was the first bucket wheel excavator to be employed in Malaya so the experience with it should prove extremely valuable in equipping the Hong Fatt opencasts.

Another mine that should be raising output is Petaling which had a third dredge ready to start up at the beginning of this year while the recent annual report said that the utilization of a fourth is constantly under review.

Malayan Tin should also not be overlooked. It has a big new dredge working, but this and another dredge are currently operating in lower grade ground. This should only be a temporary phase. For the more distant future Malayan is considering the installation of a fourth modern deep-digging dredge at its Kampong Gajah property.

Ayer Hitam will currently be suffering some setback in production owing to the closing down on January 1 last of its No. 1 dredge in order to replate the pontoon, replace the sluice boxes by jigs and convert it from steam to electric drive. Its big No. 2 dredge will carry on meantime. However, by next autumn, Ayer Hitman should thus have two highly efficient units in operation with a consequent boost to its production potential.

BRITISH TIN'S TIMELY MOVE

British Tin Investment Corporation made two main changes in its investments during 1960 the first of which, a drastic reduction in the South and Central African holdings, was undoubtedly timely, being made prior to the Sharpeville riots of a year ago that touched off a great dis-investment movement in African stocks.

Whether the second change was timely is today more doubtful. It consisted, as mentioned earlier in this column, of reducing the corporation's tin shareholdings by 10 per cent in order to take advantage of the market rise that occurred in the first half of last year. Such a reduction probably looked right enough at the time but now tin shares are reaching new heights. Still, this is not a thing that B.T.I. shareholders have any need to worry about because by market value the corporation still has some 75 per cent of its investments in tin shares.

The proceeds of all these sales have been put into the U.K., America, Canada and Australia in mines and companies closely linked with the metal industries. The chairman, Mr. S. H. Smith also stated that an investment has been begun in Europe's Common Market companies and is to be extended. On December 31, B.T.I.'s investments standing in the balance sheet at £1,489,146 had a market value of £7,162,779.

The chairman is naturally bullish about tin, the prospects for which he considers to be "definitely good" and he anticipates that in the absence of some major political or industrial upheaval revenue in 1961 "will prove satisfactory to the members of the corporation". These members will no doubt feel that they are entitled to be a little more enthusiastic than this rather guarded phrase implies and that there looks to be appreciation possibilities in B.T.I. 10s. shares at 37s. to yield 9.2 per cent on the 1960 dividend of 34 per cent. Chairman's statement is on page 285.

ASHANTI'S PROFITS KEEPING UP

The unexpectedly higher dividend and the record earnings of Ashanti Goldfields for the year to last September have already been commented on here (*M.J.* January 20). The full report for that year, issued this week, was almost overshadowed by the February return which was outstanding in that it produced this Ghana gold mine's highest ever monthly gold production, 32,750 oz.; the grade of ore mined (not, it is to be noted, milled) was at 22.45 dwts. a ton the highest for no less than 14 years; and the profit at £157,934 brought the total to date for the first five months of the current financial period up to £747,842. This is nearly £3,000 higher than at this time a year ago despite the impact of the statutory increase in African wages, an increase that has hit the rest of the Ghana gold mining industry hard and has, in fact, been the chief factor leading to the current Ghana Government take-over bid for five of the London-controlled mines.

In 1959-60 Ashanti only felt the effect of this wage increase for three months and its production and treatment costs rose by only 6d. to 71s. 9d. a ton. There was, however, a sharp rise of 6s. in development cost per ton to 23s. 9d. This was only partly due to higher wages.

(continued overleaf)

London Market Highlights

South African Gold shares became a much happier market after having made a distinctly unpromising start to the week. Initial hesitancy followed the weekend news of the D-mark revaluation which further dampened hopes of a higher gold price and there was also some caution in front of the Commonwealth Prime Ministers' Conference.

But no selling developed and after being marked down for a while on Monday morning prices soon rallied when a few tentative Johannesburg buyers appeared. The recovery continued on Tuesday and became a general advance on Wednesday when it became only too evident that there was a serious shortage of stock in London. It thus needed little business to produce some sizeable gains. Most of the admittedly modest demand came from Johannesburg where there was a feeling that earlier fears of South Africa leaving the Commonwealth had, perhaps, been exaggerated. A few cautious buyers here were also influenced by the weakness of sterling.

Leading Wednesday's advance were Western Holdings with a spurt of 3s. 1½d. to 136s. 3d. while St. Helena jumped 2s. 6d. to 68s. 9d. with relatively few shares changing hands. Free State Geduld improved on previous gains inspired by talk of high development values in the "jackpot" area with a fresh rise of 1s. 10½d. to 110s. 7½d. Johannesburg demand continued for shares of the Kinross group, Bracken (28s. 9d.) and Winkelhaak (26s.) being outstanding here with rises of 1s. 6d. apiece.

In the finance group, Cape institutional buyers raised Anglo American 3s. 9d. to 148s. 9d. London demand was more of a factor behind gains of 2s. in Gold Fields (59s. 3d.) and in Union Corporation (57s.) De Beers mirrored the general trend at 150s. 7½d.

Copper issues were also looking brighter but improvements were much smaller than those in Kaffirs and the market remained very sensitive. Rhodesian Anglo American (52s. 9d.) and Rhokana (42s.), however, each moved up 1s. 3d. despite the imminence of their 1960-61 interim dividends which could well be reduced.

Tin shares continued to move steadily higher. There was no rush of buying nor any sharp rise in prices but it was clear that interest in this market was at long last broadening. Tongkah Harbour, for example, gained 5s. to 65s. and the sharp rise in the February output of Lower Perak was greeted by an improvement of 1s. 3d. to 32s. 6d. in the share price.

Among the more popular issues, Sungei Besi moved up 1s. 3d. to 29s. 6d. on a Singapore demand which was partly interrupted by a break-down in telephonic communications. Other gains were scored by Ayer Hitam (29s. 6d.), Tanjong (26s. 9d.) and Pengkalen (12s.). British Tin moved up 9d. to 37s. 9d. following the encouraging annual report. Ampat (12s. 9d.) were unaffected by the news that repairs to the Bidor dredge were commenced on February 3 and that the unit is likely to be out of action until the latter part of April.

MINING FINANCE—*Continued*

The main factor was an increase of 33 per cent in the footage done. This development acceleration has brought Ashanti to the happy position of having ore reserves some 5½ years ahead of the mill at 2,558,287 tons with a grade of 16.89 dwts., lower by 0.35 dwts. compared with a year previously. Consequently no further increase in the development rate is planned.

The consulting engineers put the planned monthly crushing for 1960-61 at 37,500 tons for an expected recovery of 30,000 oz. of gold compared with an average of 36,400 tons and 29,800 oz. respectively last year. Technically there seems no doubt whatsoever that the chairman, General Spears, will have a happy story to tell at this year's meeting on March 29.

Meanwhile, Ashanti 4s. shares remain a rather dispirited market at around 13s. 6d. to yield 16 per cent on the 2s. 2d. dividend which unless anything untoward happens looks like being maintained this year.

★

The Ghana State Mining Corporation, which is to be the holding company for the shares of the five gold mines which the Ghana Government has offered to buy, is composed of a board of seven directors, together with 59 workers made up of ten from each of the five companies who will be associated with the management of the mines "in a purely consultative and advisory capacity". The Hon. E. Ayeh-Kumi, chairman, (executive director of the Ghana Development Secretariat); other directors are: Sir Charles Tachie-Menson (director of Ariston and Ghana Main Reef); Mr. Mark Botsio Mr. D. K. Foevie; Mr. H. P. Hinchcliffe; Mr. F. Clelland (consulting engineer to Western Selection); Mr. D. A. Bates (director of Geological Survey).

CONSOLIDATED MINES SELECTION

The 1960 results of Consolidated Mines Selection, the London-based mining investment company in the Anglo American Corporation group, were commented on here at length on February 24. In the full report the chairman's statement confirms that the omission of a capitalization issue on this occasion was prompted by a feeling that such a distribution would not be "appropriate" in the light of the depreciation in the value of investments caused by the poor showing made by South African shares during the greater part of last year. As a result the market value of the company's quoted investments dropped from £6,284,351 to £4,781,499 although the book value at £2,120,008 is little changed from that of a year previously. However, the overall appreciation is still more than 100 per cent.

The chairman's statement says that despite the drop in market values C.M.S. does not regard the prospects for the individual companies in which it is interested as being any less favourable than they were. A continued good return is expected on investments which "are spread widely and offer reasonable prospects for growth". Despite present difficulties the Board retains its firm con-

(continued on page 287)

FALCON MINES

The fifty-first annual general meeting of Falcon Mines, Ltd., will be held on March 29, in Bulawayo.

The following is an extract from the Statement of the Chairman, **Mr. F. L. Wigley**, circulated with the Report and Accounts for the year ended September 30, 1960:—

Your Company's issued capital was increased during the year to £499,293 by the issue of 181,561 new shares which were offered to members in February, 1960 at a price of 8s. per share in the ratio of one new share for every ten held.

The Net Profit for the year was £154,776. An amount of £14,910 has been written off loans to an associated mining company and the appropriation for expenditure on Fixed Assets and Mine Stores was £29,617. After providing for Dividends Nos. 13 and 14, totalling 1s. per share (20 per cent), which absorbed £95,319, there remained a balance unappropriated of £24,376, compared with £9,446 brought forward from last year.

At the Dalny Mine, ore from the Pixy section and from surface dumps, together with a small additional tonnage from the Dalny section, enabled the monthly milling rate to be raised gradually from 20,000 tons in June, 1960, to 22,500 tons in October, 1960, at which level it has since been maintained. As working costs and gold recovery per ton milled remain substantially unchanged, there has been a proportionate increase in the monthly profit earned.

The total development footage accomplished in the Dalny and Pixy sections was 14,273 feet, compared with 10,991 feet for the previous year, but the percentage payability of the Dalny section declined slightly owing to the existence of a barren area on the west side of this section, as exposed by work on 12 level. The exploration of the Dalny orebody at depth was continued by means of a main winze sunk from 13 level to 15 level. Higher than average values were encountered in the 15 level drive, both east and west of the winze. The west drive was advanced in good values for a distance of 400 feet but has now become unpayable. Driving continues and the current year's work will determine whether the impoverished zone encountered on 12 level extends to this horizon. The east drive entered the geological feature which demarcates the eastern boundary of payable mineralization sooner than expected. On the Pixy section the shaft was sunk to its projected depth of 518 feet and once a connection had been made between 5 and 7 levels, ore from development and stope preparation was sent via the Dalny 7 level crosscut to the Rix shaft. With the completion of this phase, work is now being concentrated on lateral development of the Pixy orebody in order to determine the length of the payshoot. Until this has been done and stoping conditions have been tested the capacity of the Pixy section to supply ore to the mill cannot be fully assessed.

The ore reserve has been maintained at a satisfactory level in which regard an increase in the width of the Dalny orebody and the tonnage contributed by the Pixy section have compensated for the somewhat lower payability of the Dalny section during the past year. The estimated reserve at September 30, 1960, was 681,000 tons valued at 5.04 dwts. over a width of 111 inches. The steady rise in ore reserve value during recent years is encouraging and has permitted corresponding increases in the grade of ore sent to the mill.

The development of the Dalny section has now reached the stage where permanent arrangements must be made for handling ore below 13 level and for continued exploration at depth. Accordingly your Board has accepted a recent recommendation of the Company's Consulting Engineers that a subvertical shaft, collared on 13 level, be sunk to a depth of 1,100 feet at an estimated cost of £110,000. This expenditure, which will be met from revenue funds, will be spread about equally over the next two financial years and your Directors are satisfied that under normal conditions dividend distributions can at least be maintained.

Good progress has been made with the exploration of the Arlandzer section where two old incline shafts were dewatered and reclaimed and then carried to the 250 foot level. A third, vertical, shaft was also sunk from surface to the same horizon. The initial results obtained in the drives from these shafts are contained in the Consulting Engineers' Report and although values are marginal, they may be regarded as satisfactory at this stage. It is anticipated that the entire strike length of about 3,500 feet will have been traversed at the 250 foot level by April, 1961, and the further exploitation of this section will depend on the results obtained from this work. The cost of the Arlandzer programme, which amounted to £36,886 at September 30, 1960 is being met from funds made available by the new issue of shares and the expenditure for the year has been capitalized.

The directors of Hadfields Ltd. announce that H.M.K. Sales Ltd. (formerly Millspaugh (Canada) Ltd.) will control and promote the marketing in Canada of all the products of the Hadfields group of industrial companies, which includes Millspaugh Ltd., of England, The William Kennedy and Sons Ltd., of Ontario, and other companies of the Hadfields and Millspaugh groups. The sales staffs in Canada of the individual companies will continue to operate within the frame of H.M.K. Sales Ltd. The following appointments are announced, effective December 1, 1960; John van Hemert of Montreal has been appointed vice-president and managing director of H.M.K. Sales Ltd., J. C. Stavert has been appointed vice-president, Production, of The William Kennedy and Sons Ltd., R. C. Heys of Sheffield, director of Hadfields Ltd. and managing director of Millspaugh Ltd., is president of H.M.K. Sales Ltd., and Mr. H. M. Smith of Owen Sound is president of The William Kennedy and Sons Ltd.

BRITISH TIN INVESTMENT CORPORATION

INCREASED GROSS REVENUE

Mr. S. H. SMITH'S STATEMENT

The Annual General Meeting of British Tin Investment Corporation Limited will be held on March 29 at St. Swithin's House, 11/12 St. Swithin's Lane, London, E.C.4.

The following are extracts from the Statement by the Chairman, **Mr. S. H. Smith, O.B.E., M.C.,** circulated with the Report and Accounts:—

For the year ended December 31, 1960, the gross revenue of the Group was £942,243, compared with £520,297 in 1959. Administrative expenses amounted to £16,976 (1959 £17,184) and provision for taxation to £443,660 (1959 £227,058), leaving net revenue for the year after tax of £481,281 (1959 £276,055).

After bringing in £6,064 for tax adjustments, compared with £2,239, the net surplus for the year is £487,345. The corresponding figure for 1959 was £294,444 which included £16,150 brought back into credit from the provision against the subsidiary company's investments.

During the year 1960 certain tin companies in which the Group has large holdings brought forward the dates upon which they paid their dividends. As a result of these changes the Group received in dividends in 1960 a net sum of approximately £56,000 more than it would have received if no such changes had been made. We cannot expect that there will be in 1961 a repetition of this fortuitous increase in the Corporation's income, and the Board has therefore decided to retain in the business the major part of this increment.

The Directors recommend a final dividend of 27 per cent for 1960, making a total of 34 per cent for the year, compared with 22 per cent for 1959. This, if approved, will leave the Group carry forward at £252,463, compared with £203,502.

Changes in Portfolio

During the year we have made significant changes in our portfolio. Before the Sharpeville riots in March 1960 we reduced drastically our holdings in South and Central Africa, as the Directors felt concern about the political situation there. As a result of these and other reductions made in the early summer, our total investments in the Rhodesias and South Africa now represent 1.3 per cent by market value at the close of 1960, of our total investments. We have retained our investment in Nigeria which represents 2.7 per cent (by market value) of our total funds.

The proceeds from the sales referred to in the preceding paragraph were invested in mining concens in the United States of America, Canada and Australia, in most cases by increasing our existing holdings.

I pointed out last year that shares in tin companies represented about three quarters of the market value of our portfolio. By the summer of 1960 this percentage had increased considerably owing to the rise in the prices of tin shares. The Directors took advantage of this rise to sell approximately 10 per cent of our total tin holdings. Our tin shares still represented at the end of 1960 about 75 per cent of the whole, measured by market value. The proceeds of these sales were invested in a wide range of mining shares and in shares of industrial companies closely linked with the metal industries in the United Kingdom, U.S.A., Canada and Australia. We have also begun to invest in high class companies in the countries of the Common Market which are concerned with metals and minerals, and we intend to acquire further similar shares as and when opportunity arises.

The total market value of the Group's investments at December 31, 1960 was £8,371,912, as against £8,124,394 at the end of 1959.

Under the current International Tin Agreement, permissible exports by the six producing countries who are parties to the Agreement were increased progressively to 37,500 tons in the second and third quarters of 1960. For the fourth quarter of 1960 and the first quarter of 1961 all restrictions on exports were removed. The price of tin has kept relatively steady since restriction of exports ceased, although American purchases have fallen away sharply.

Good Prospects for Tin

In my opinion, the prospects for tin are to-day definitely good. The Government in Malaya continues to inspire respect and confidence. World consumption of tin in 1960 was high in spite of a reduced demand from U.S.A., the greatest tin consumer. The tinplate industry is by far the largest user of tin and in spite of a recession which I believe to be temporary that industry is pursuing a vigorous policy of expansion in several countries. There is still a huge potential market in the under-developed countries. As always, there are political storm clouds on the horizon but personally I do not think they are so threatening as to undermine our confidence.

At the moment of writing the copper position appears to be that the reductions in output and/or exports have not yet obliterated the current world copper surplus. This surplus almost entirely arises from a sharp decline in American copper consumption. It is to be hoped that, before long, there will be another upsurge in American industrial activity, and it is most likely that this will result in a return of American copper consumption to more normal levels. Moreover, whilst the immediate outlook for copper may be somewhat clouded, it is of considerable importance that from 1961 onwards, the new additions to the world copper supplies are likely to be less than the normal secular growth in world copper consumption. I am, therefore, convinced that the long term outlook for copper is satisfactory.

During the latter part of 1960, the impact of the American recession had its effect on both lead and zinc, with the result that substantial falls in prices took place.

Another meeting of the International Lead and Zinc Study Group is due to take place in the early Spring of 1961. If the Study Group decides to abandon any restrictive measures in the case of lead, it is unlikely that this metal will make any recovery in price until a period of relatively low prices has lasted long enough to close down the marginal high cost producers. Moreover, lead itself is, from the consumption angle, in a less favourable position than zinc. There seems little doubt that the secular trend of zinc consumption throughout the world is rising at an encouraging rate. Lead, however, has suffered, and is still suffering, from the competition of other materials.

Problems of oversupply continue to face the oil industry. But earnings of the major oil companies have, on the whole, been well maintained in 1960, and so far as dividends are concerned, we received a larger income from our oil shares in 1960 than we received in the preceding year.

Finally, I anticipate that, in the absence of some major political or industrial upheaval, our revenue in 1961 will prove satisfactory to the members of the Corporation.

Coming Events

The Society of Mining Engineers of AIME will commemorate the 50th anniversary of froth flotation in the U.S. with a special international programme in Denver, September 17-20, 1961, under the auspices of its Minerals Beneficiation Division.

★

A two-day conference on the use and application of radioisotopes in the mining industry will be held in Denver, April 13 and 14, under the sponsorship of the American Mining Congress and the Colorado School of Mines Research Foundation, in co-operation with the U.S. Atomic Energy Commission.

★

The Sixth International Galvanizing Conference is to be held at Interlaken, Switzerland, June 4 to 9, 1961. Those wishing to attend as delegates should contact the Zinc Development Association without delay. Papers will be presented by international experts, and plants in Switzerland and Italy will be visited.

★

The Royal Institution of Chartered Surveyors will hold a general meeting of mining surveyors on March 25, at 9.45 a.m., at the Scottish branch of the Institution in Edinburgh, when a paper entitled "Scottish Developments in the mining industry" will be read by Professor R. McAdam.

THE CHARTERED BANK

A YEAR OF STEADY PROGRESS
RECORD BALANCE SHEET TOTAL
MR. V. A. GRANTHAM'S REVIEW

The 107th Annual General Meeting of The Chartered Bank will be held on March 29 at 38 Bishopsgate, London, E.C.

The following is an extract from the Statement by the Chairman, **Mr. V. A. Grantham**, which has been circulated with the report and accounts for the year 1960:—

The Bank's Balance Sheet

During the accounting period to which this statement relates the bank has continued to make steady progress and our subsidiary, The Eastern Bank Limited, has contributed to the favourable results which have been achieved by the group. The record figure of £270,390,101 set up in last year's balance sheet total has soon been outstripped, for the accounts now placed before you reflect the further expansion of the Bank's business by an increase of £45,813,097, producing a new record total of £316,203,198.

The Consolidated Balance Sheet total of £362,759,636 shows an increase of £45,737,927 over that of last year.

Consolidated Profit and Loss Account

We have adopted the practice of the leading banks in the City of London by making all allocations to Premises Account, Pensions and other Staff Funds, before arriving at our published profits and last year's figure has been adjusted accordingly.

In the current year our profit of £761,916 is arrived at after deducting £155,000 (1959—£145,000) on account of Pensions Fund and Widows' and Orphans' Fund and £250,000 (1959—£250,000) on account of Bank Premises so that in comparison with 1959 the profit shown has been increased by £142,220.

In September last we paid an interim dividend of 8 per cent less income tax absorbing £245,000 and it is now proposed that out of the balance available a final dividend of 7½ per cent less income tax, on a capital which has been increased during the year to £5,500,000 be now paid at a net cost of £252,656.

We have transferred £250,000 to Reserve Funds, bringing the total of those Funds up to £5,750,000, and there remains to be carried forward a balance of profit of £506,254, an increase of £14,260 over that for last year.

Oversea Survey

During 1960 international trade continued on a substantial scale. A rising standard of living in the world, an ever-increasing population and increased industrial development everywhere, would appear to point to continued trade expansion, but certain signs are appearing which indicate a possible halt in this trend and perhaps the most important immediate factor is the likelihood that business turnover in the United States may not increase as quickly as anticipated. Unless conditions in the American market improve in the coming year and stimulate demand for industrial raw materials, the export earnings of the primary producing Asian countries, in which the Chartered Bank group is established, must be adversely affected. Another deterrent to the growth of international trade is the chronic shortage of foreign exchange in many countries, particularly in the East, which, with a desire to protect new manufacturing industries, has led to the imposition of far-reaching import restrictions. Often these restrictive measures are imposed by force of circumstances but one cannot view with equanimity efforts to protect local manufacturing units which have little hope of ever becoming economic propositions able to compete on equal terms in international markets. In fact, for some years it has seemed likely that the emphasis placed on industrialization by the younger countries in particular, and often at the expense of agriculture on which their economies depend, designed primarily to have the effect of reducing imports, may in these coming days of balanced trade, make it increasingly difficult for them to find buyers for their own export products.

It is within this involved situation that our government, like that of the United States and many other highly-industrialized countries, is now launching an export drive but we find that the growing awareness in this country of the necessity to export is not, so far, being translated into efforts to find new markets. It is a common complaint by officials and businessmen in a number of Eastern countries that the United Kingdom shows little interest in their markets, which they point out is in marked contrast to the attitude of the Germans, the Japanese and others. There is undoubtedly some truth in what is said for it often seems that either our good and usual exporters have already sufficient buyers for their products, and cannot devote the time to smaller and less known markets, or there is an instinctive feeling that too much risk is involved. Sometimes there is risk but usually, with competitive prices and a willing buyer, means can be found to arrange shipments on a satisfactory basis and by its advice on this, and with the knowledge of markets gained from one-hundred and ninety branches in twenty-six countries, it is felt that the Chartered Bank group should be able to do much to aid materially the efforts of our exporters.

Cyprus

Economic prospects are perhaps more promising than might appear from the substantial trade deficit, for the Republic's export earnings, equivalent to less than half the total imports, are substantially supplemented by British Government expenditure on its armed services based on the island.

The new government has wisely refrained from introducing any extreme measures to meet the economic situation with which it was confronted and is evidently hoping for a return of confidence which will be reflected in a general improvement in business.

India

India is now on the threshold of the third five-year plan, which starts in April. It is no exaggeration to say that the critical phase has been reached in the enormous task of raising within the constitutional framework of parliamentary democracy the living standards of a population now estimated to number approximately four-hundred-and-thirty millions. It is generally agreed that the first and second five-year plans have successfully laid the foundations necessary for further economic advance, and the various criticisms so often voiced of this or that aspect of Indian planning policy must not be allowed to obscure the magnitude of what has already been achieved.

The success of the third five-year plan can only be relative to India's ability to raise the necessary foreign exchange for the point has now been reached where future development is dependent upon external credits and aid funds. So far, official visits abroad have resulted in pledges covering approximately one-quarter of the external cost of the projects in the plan, but no doubt considerably larger grants will be forthcoming as it seems clear that the governments of the West will have to help India for many years to come. India can itself contribute to the success of its ambitious plan by increasing exports but can save little on imports which are now no more than sufficient to keep industry going. In time the manufacturing industries developed under previous plans can be expected to make a useful contribution to export earnings providing costs can be kept down, but for some time to come reliance for help in this direction will have to be placed on the traditional exports, tea and jute.

Pakistan

Sound leadership, political stability and a pragmatic approach to its problems made 1960 a good year for Pakistan.

The authorities have shown a welcome flexibility in meeting current economic problems. Foreign aid is still required but generally the situation is favourable. Agricultural production has increased partly due to weather conditions favouring crop production, but for some years to come the country's export earnings will continue to depend on raw jute and, to a lesser extent, cotton. An improvement in the level of exchange reserves has enabled the government to liberalize imports in furtherance of its policy of reducing the price of consumer goods and of providing raw materials sufficient to keep industry operating on the basis of a one shift capacity.

In the long run the future living standards of the population are going to depend very much on the success or otherwise of the second five-year plan, which came into effect last July. Laying the emphasis as it does on agricultural development, the plan is a realistic effort to meet present needs in the light of the domestic financial resources available and of the foreign aid that is likely to be forthcoming.

Singapore

The fundamental economic problem in Singapore is to provide adequate employment opportunities for a rapidly increasing population, approximately half

of which is under the age of twenty-one. To meet at all successfully the coming demand it is essential that the entrepôt trade, long the mainstay of the economy, be maintained.

The other important factor for the provision of employment will be the measure of progress made in Singapore's own industrial development, and in this connection it is promising that the government has been strong enough to come to grips with what have hitherto been major obstacles to progress, that is irresponsible trade union activities and bad labour relations generally. The Economic Development Board, whose proposed formation I mentioned last year, may soon be in action. It is not so much an abundance of planning that is required at this stage, however, but rather determined action to build and run the manufacturing units which are to produce the good quality goods for home consumption and for abroad.

I do not think that anyone would deny that the record of the present government in Singapore over nearly two years of office is of a high order and has shown a realistic approach to a situation, political and economic, which at times must have been far from easy to handle.

Hong Kong

The dominant impression the visitor receives of Hong Kong is still of a bustling, thriving community, crowding through the streets with an object in life and this impression would correctly reflect the vitality and the intensive application to the task in hand of a people that once again have given the Colony a prosperous year with increased exports and trade turnover. An indication of the remarkable industrial progress of recent years is that locally manufactured products now account for over seventy per cent of export earnings and the range of local manufactures is steadily widening and finding expanding markets abroad. There are weaknesses in the economy and the tendency of some of the new under-capitalized and ill-equipped manufacturers to lower standards of shipments may affect Hong Kong's good name in oversea markets and have serious repercussions. An example of this was to be seen in the garment industry which, after meteoric expansion, faced claims and large cancellations of orders in the middle of the year. The textile industry generally has, however, been outstanding in increasing its productive capacity and textile exports as a whole showed an appreciable rise during the year.

We ourselves opened a new office at Tsuen Wan last August and hope to open our main Kowloon office and also one at Shamshuipo shortly.

Conclusion

This review emphasizes the extent to which most of the countries of the East are dependent upon foreign aid and investment for the success of their development plans. It indicates, too, the tendency of these countries to hem themselves in with trade and other restrictions but what it does not show is the repercussion of these policies on the ordinary trading activities of foreign business. The Chartered Bank, which has operated in many of these countries for nearly one-hundred years and has always identified itself with the local economy, is prepared, as I am sure other British enterprises are, to co-operate with the authorities and assist in their national aspirations and it is all the more disappointing, therefore, to find increasing discrimination against our participation in trade and commerce. On the sanctity of existing capital and the treatment of existing commercial undertakings must largely depend the advent of new capital, for new capital can be expected mainly from those who know the territory and have confidence in it, i.e., existing investors and traders. To add to the difficulties encountered through governmental action is the excessive competition arising from the over-banking of many cities in the area. In not all places is this as chronic as in Hong Kong, where there are now over eighty banks, but the general tendency of international banks to open branches in our territory and of small local banks to spring up overnight, often with the encouragement of large banking interests in this country, means a regrettable lowing of banking standards. This trend must finally be to the disadvantage of the country concerned for, not only is encouragement given to the under-capitalized and often inefficient to set up industries, usually to become poor shippers and bring the country a bad name in oversea markets, but the general lowering of commercial standards may unfortunately mean losses on the part of the public.

Copies of the full text of the statement will be sent on application to the Secretary of the Bank at 38 Bishopsgate, London, E.C.2.

MINING FINANCE—*Continued*

fidence in the future of South Africa and the Rhodesian Federation.

This year C.M.S. faces some diminution in income from its copper shareholdings and there will not on this occasion be the non-recurrings factor of a special amount being received from Anglo American Corporation owing to that concern's higher than usual interim dividend for 1960, a move made in order to level out more evenly the interim and final payments.

Against this C.M.S has extensive interests in the newer South African gold mines and being a London company it is now getting increasing benefit from double tax relief on its dividend income therefrom as these mines come into the tax paying class which they are now starting to do in earnest. This is always providing that the tax impact does not cause dividend reductions by these mines, and usually the distributions are, of course, graded upwards in advance of tax liability at a rate calculated to avoid any such cuts.

All in all C.M.S. 10s. shares standing at 27s. 9d. to yield 9 per cent on the 2s. 6d. dividend look undervalued. If all goes well in 1961 it is quite likely that the practice will be resumed of making modest capitalization issues. Extracts from the chairman's statement are on page 288.

A NEW SHAFT FOR DALNY

It is almost refreshing to find a chairman of a concern operating in Southern Rhodesia who, writing his annual statement from Bulawayo, manages to eschew the vexed question of Federation politics and confine himself to a review of the past and future of his company's operations. His name is Mr. F. L. Wigley, the company is Falcon Mines, the future of which is now almost entirely bound up with the Dalny gold mine, which is improving steadily in grade. It has therefore been decided to sink another £110,000 in the mine in the shape of a new sub-vertical shaft for the handling of ore below the 13 level and for continued exploration at depth. The new shaft will have its collar on the 13 level and will be put down to 1,100 ft.

Mr. Wigley states that the estimated cost of £110,000 will be met from revenue funds and will be spread about equally over the next two financial years. The directors "are satisfied that under normal conditions dividend distributions can at least be maintained". It will be helpful in this respect that the capital redemption allowances for the Dalny mine will not be exhausted for some years to come which means that no tax will be payable.

For the year to last September Falcon made a profit of £154,776 and paid dividends of 20 per cent on the 5s. shares costing £95,319. At 8s. 9d. the yield is 11.4 per cent.

INCO'S FINANCIAL RESULTS

The implications for International Nickel of Canada of the present outlook for nickel, are discussed at some length in the company's annual report and are noted elsewhere on page 279. Despite a record sales year for nickel, Inco's net earnings during 1960 were slightly lower at $80,701,000 against $85,157,000 in 1959. Although earnings per share were thus also down at $2.76 ($2.91), dividends were slightly higher at $1.52½ ($1.50). The quarterly dividend rate was raised from 37½ c. to 40 c. the last quarter of the year, and throughout 1960 was, of course, appreciably higher than in 1959. This, however, was compensated for by the declaration of an additional dividend of 40 c. at the end of 1959, so that on balance distribution is little changed.

Among the factors which affected earnings adversely last year were reduced deliveries of nickel produced from the company's own mines and plants (some of Inco's sales were of government stocks), higher cost for labour and services and increased provisions for depreciation and income taxes. Inco's own productive capacity will, of course, be much expanded this year with the coming into production of the Thompson mine.

Rand Selection Corporation announce that, in accordance with the arrangements set out in the circular to members dated January 16, 1961, the board of directors has been reconstituted as follows:—H. F. Oppenheimer, (chairman), *Col. The Lord Robins, (deputy chairman), *K. C. Acutt, C.B.E., *P. V. Emrys-Evans, C. W. Engelhard, W. M. Frames, *H. St. L. Grenfell, R. B. Hagart, *P. J. Oppenheimer, S. D. H. Pollen, M. W. Rush, D. A. B. Watson, A. Wilson, and W. D. Wilson.

(continued on page 288)

MINING FINANCE—*Continued*

Members of the London Committee of the Corporation which has been reconstituted are L. F. A. d'Erlanger, E. C. Baring, O.B.E., and Sir Reginald W. A. Leeper, in addition to those marked above with an asterisk.

★

South Crofty announce that Mr. A. F. Taylor has been appointed a director of the company.

★

The British South Africa Co. have announced that Mr. K. C. Acutt has been appointed a director of the company.

Publications Received

The United Steel Companies have produced an attractively illustrated book, *This is United Steel*, giving a brief account of their activities in ore mining, coal carbonization, iron making and founding, and in the manufacture of a wide range of products, from fabric bearings to bridges. The group employs more than 37,000 people, and produces about one eighth of the nation's steel. An outline is given of the companies' research departments, statistics of outputs of main products and various works' services.

★

At a Mining Congress held in Budapest in September 1960, in celebration of the Tenth Hungarian Mining Day, papers were given by mining authorities from all parts of the world. These have now been translated into German, and are published, in four volumes, under the title *Bergbau Kongress Budapest, 1960*, and are obtainable from Kultura, Budapest 62, P.O.B.149, Hungary.

★

A data book, giving details of linings, pads and drive belts for a wide range of earth-moving and civil engineering equipment, industrial plant and oil drilling gear has recently been published by Ferodo, entitled *Friction Materials for Engineering Equipment*. This catalogue of 270 pages, includes a price list and separate illustrated introduction, and is available at any Ferodo depot, or from Ferodo Ltd.

THE CONSOLIDATED MINES SELECTION COMPANY LIMITED

INVESTMENT POSITION REMAINS STRONG

Confidence in Future of Southern Africa

The following is from the statement by the late **Mr. Comar Wilson,** who was chairman of the company until his death last month.

The outstanding feature of the year's results is that the income from investments exceeded £400,000 for the first time in the Company's history. Included in income from investments is, however, a special amount from Anglo American Corporation of South Africa as a result of that Corporation levelling out its rate of interim and final dividend payments. Even after disregarding this non-recurring item, our investment income shows an increase of some 10 per cent., over last year.

Double Taxation Relief Benefits

The buoyant trend in the market for Southern African shares which had continued throughout 1959 changed early in 1960. Following the regrettable events and political disturbances in March 1960 and the subsequent declaration of a state of emergency in South Africa, all share prices fell substantially. Conditions were not such as to encourage us to dispose of investments and profits from realizations were small. However, our overall profit after taxation was some £20,000 higher than the previous year The profit before tax was actually smaller than last year but the amount of relief from double taxation was considerably greater, thus reducing our liability to taxation in the United Kingdom.

Although the Rhodesian copper companies achieved excellent trading results and we received increased dividends from this source, the changed attitude of investors towards African securities was reflected in the market prices of Rhodesian copper shares as well as in the shares of South African gold mining companies.

As a result of the substantial fall in Stock Exchange prices, the total market value of our quoted investments dropped from £6,300,000 at December 31, 1959 to £4,800,000 at the end of 1960, the book value being virtually the same at both dates. The fall in market values required us to write down our quoted investments by £150,000, although our investment position remains strong since the overall appreciation of market values over book value is still more than 100 per cent. We have also written down our shares in prospecting companies by £43,000. The total amount written off investments, both quoted and unquoted of £227,000, has been charged to general reserve, reducing the consolidated general reserves of the Company and its subsidiaries from £525,000 to £298,000 We have considered it prudent to transfer to general reserve the sum of £127,000 from unappropriated profits, thus bringing the general reserve up to a total of £425,000. We do not consider in the circumstances that it would be appropriate to make a bonus issue this year, but we propose to make a cash distribution at the same rate, 2/6d. per share, as in recent years but payable on the capital as increased by the bonus share issue made in March 1960. This involves an increase in distribution of £16,700 as compared with last year.

Effect of Political Issues on Investments

Although judged in terms of current market values our portfolio shows considerable depreciation in comparison with last year, we do not regard the prospects for the individual companies as being less favourable. We can expect to continue to receive a good return on our investments which are spread widely and offer reasonable prospects for growth. The mining industry in Southern Africa has progressed well. Shareholders will have seen the recent announcements by the South African uranium producers regarding rationalization and stretch-out and we believe that these arrangements will result in considerable benefits. The important political issues, with which the Rhodesias are confronted, are now under active consideration and discussion, and until acceptable solutions to the many problems involved in the development of a multi-racial state appear to emerge, the market for Rhodesian investments is likely to continue to be affected adversely. In addition, at the present moment the supply of copper in the world exceeds demand and a 10 per cent cut was introduced last October by the Rhodesian producers. We believe however that reasonable solutions will be found to these urgent political and social problems in the Central African Federation and in South Africa and accordingly we have continued and firm confidence in the long-term future of these territories.

Mr. Comar Wilson

The death of our Chairman, Mr. Comar Wilson on February 14 is recorded with the utmost regret.

His business interests were widespread and his outstanding talents, energy and enthusiasm were of the greatest value to this and the many other companies he helped to administer. In addition the charm of his personality evoked the high regard of his colleagues and all who came into contact with him.

Mr. Wilson's counsels will be sorely missed in the affairs of this Company, and his colleagues on the Board and those whose privilege it was to work with him pay warm tribute to his memory.